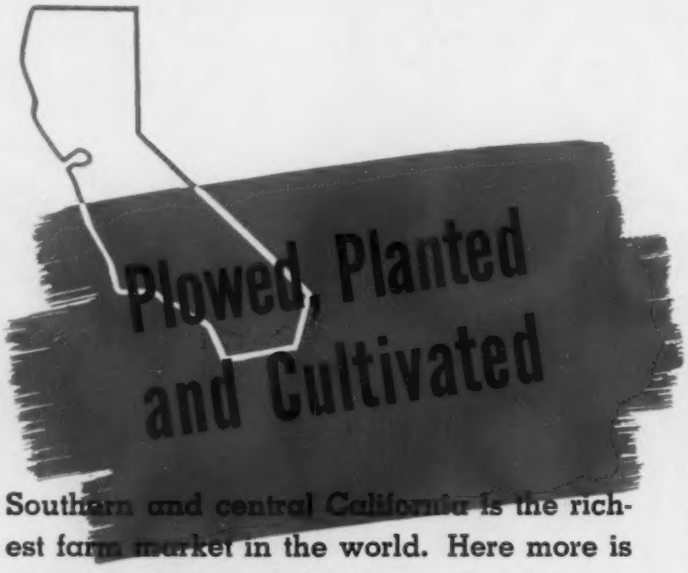
ELECTRICAL WEST

THE ALL-INDUSTRY MAGAZINE OF PROGRESS

November, 1941

GRAND COULEE
PICTORIAL INSERT

25c a Copy



Plowed, Planted and Cultivated

Southern and central California is the richest farm market in the world. Here more is spent for electric appliances and equipment than in any other major farm market. The Edison Company, through continuous advertising—in the farm papers, by direct mail and with special booklets—cultivates this market. Electrical dealers, in surrounding cities and towns, reap the harvest of sales. Get your share. Watch Edison advertising. Then cash in with displays, demonstrations and your own advertising.

"Old Faithful! Just like my Electric Pump back home"
ELECTRIC PUMPING IS DEPENDABLE. It starts at the flip of a switch. It needs no tinkering or watching. It operates, when needed, twenty-four hours a day—every day! And this better, trouble-free service actually costs you less. Ask your electric pump dealer or at the Edison office for complete details. You'll find that more than nine out of ten California farmers are using electric pumping.
3 GOOD BOOKS Free
Learn about the extra profit electricity makes possible on your farm. Here are three interesting booklets that will help you earn more money with electric power. Write for your copies to Edison Company, 601 W. 5th St., Los Angeles.
SOUTHERN CALIFORNIA EDISON COMPANY LTD.

IT'S JUST LIKE FINDING MONEY!
ELECTRIC PUMPING SAVES FOUR WAYS . . . It saves on first cost. An electric motor costs only one-third to one-half as much as comparable power units. It saves on depreciation. An electric motor lasts two to three times longer—the annual loss from depreciation is about one-tenth that of other pumping units. It saves on operating costs. The figures prove that the upkeep of an electric motor is less than one-tenth that of other power units. It saves on labor. Electric pumping is dependable—requires no tinkering or watching—you can spend your time in productive labor. That's why more than nine out of ten California irrigators now use electric power for irrigation. Call your Edison office for the facts about economical electric pumping.
SOUTHERN CALIFORNIA EDISON COMPANY LTD.

"I GET A LOT MORE DONE SINCE I GOT THAT ELECTRIC PUMP"
ELECTRIC PUMPING is easy and trouble-free. You just flip a switch to start it. Anyone can do it. And then it runs itself—24 hours a day if you wish, day after day. It requires no refueling or complicated lubrication. An electric motor needs little attention of any sort to keep it in the best of condition year in and year out. Get full information about electric pumping at your Edison office or your pump dealer.
FREE: Three good books on irrigation, poultry and dairying that show how electricity can save you time and money on your farm. Write for your copies to the Southern California Edison Company, 601 West Fifth Street, Los Angeles, California.
SOUTHERN CALIFORNIA EDISON COMPANY LTD.
SOUTHERN CALIFORNIA Edison

ELECTRICAL WEST (with which is consolidated The Journal of Electricity), November, 1941. Vol. 87, No. 5. Published monthly by the McGraw-Hill Company of California, 68 Post Street, San Francisco, Calif. Entered as second class matter at the post office at San Francisco under the Act of March 3, 1879. Additional entry as second class matter at the post office at Los Angeles. Printed in U. S. A. Subscription rate in U. S. and U. S. possessions, and Canada, $2 per year; all other countries $3 gold (thirteen shillings). Single copy 25c.
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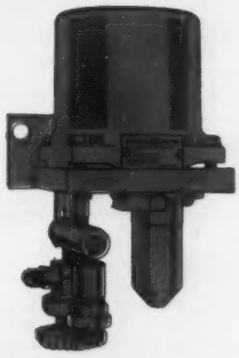
Whenever  THIS RELAY OPERATES

you'll save $1000 to $1500

Because
GAS-FILLED* CABLE WARNS YOU BEFORE FAILURE

*"G F"—new self-supervising cable for 10 to 40 kv

POWER COMPANY ENGINEERS tell us that the cost of repairing a cable failure averages between $1000 and $1500. Failure of solid-type paper-insulated cable occurs without warning, and the damage is done.

Now, with the development of General Electric's "G F" (gas-filled), you can get a self-supervising cable that is economical for 10 to 40 kv. If there should be a leak, the lessening of gas pressure itself will work the relay, and any time this happens you'll be saving the expense of a major cable repair—plus the intangible benefits that accrue when service interruption is prevented.

Furthermore, gas-filled cable gives you this choice:

1. You can locate and make the repair immediately before further damage, or—

2. If the warning sounds at a time when the cable cannot be taken out of service, you can valve-feed enough extra gas to make up for the leak until a more convenient time.

Two Types Available—both single-conductor and three conductor. For a copy of our descriptive bulletin, GEA-3652, or for a quotation, inquire of the G-E office near you. General Electric, Schenectady, N. Y.

GENERAL ELECTRIC

501-6-1200

Here in the WEST

People

Scott Beamer

after graduating as an electrical engineer from University of California, worked in the shop at Pacific Electric Motor Co., Oakland, then joined the expanding staff of the Farm Security Administration, U. S. Dept. of Agriculture. He is now associate electrical engineer for Region 9 (p. 54).

Don Atkinson

has been instrumental in pioneering a new electrical idea at the Atkinson Brick plant in Los Angeles. He describes it in an article on p. 56, which includes figures on substantial savings made with the device.

Bert T. Heinz

worked and sang his way through University of Washington with a banjo, learning showmanship which still helps in the presentation of light conditioning sales ideas to utility and dealer audiences (p. 50). He is Northwest representative for Light Conditioning Sales Service, resident engineer for Silvray Lighting, and was secretary of the Washington State chapter, IES, last year. He has just returned from a dealer meeting tour of Montana.

Preview

PCEA Conclave

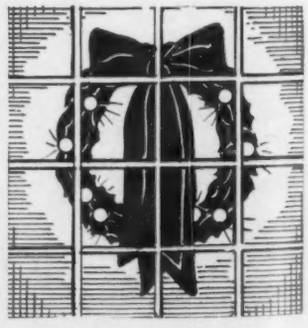
A joint conclave, instead of separate ones for both northern and southern parts of the territory, will be held at Fresno, Nov. 6-7. In view of the extraordinary conditions in the industry, that meeting will undoubtedly be filled with clues as to future trends in engineering and operations, business development and administrative services. At least the editors will watch it for such clues and report them to you in the December number.

Post Office

in San Francisco recently built had some original installation techniques used in it. The story has never been told but is promised for the next issue, along with a number of lighting and wiring ideas and methods.

More Light

will be spread throughout the West by the programs on light conditioning. There wasn't room for a full review in this issue; there will be more in the next. Outdoor and indoor Christmas lighting will be illustrated, new street safety lighting, industrial and commercial too.



Automatic Irons

are still available and are well nigh a necessity, war or no war. Sales slants on the automatic iron, health and sun lamps, (which the Canadian government considers a defense health necessity) will be reviewed seasonably.

Pages

Largest Structure Ever Built by Man 29
Pictorial insert of Grand Coulee.

Light Conditioning Sales Roundup 50
The story of what various companies are doing to stimulate sales in one field where stocks are still available; and their plans for long-range activities in light conditioning.

Defense Housing Speeded 54
By SCOTT BEAMER—Portable knock-down dormitories developed for emergency housing.

New Products 6

Bulletins, etc. 22

Electra's Husband 26

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Sales 49

Sales Guide 45

Lighting and Wiring 54

Editorials 60

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News 65

Cover picture is an aerial view of Grand Coulee Dam, showing the living quarters for permanent personnel in foreground. See pg. 29 for beginning of special, 16-page pictorial insert on this project.

Sales Keep Going Up

ADD TO YOUR PROFITS ***this year by featuring these fast-selling Arvin Circulating Heaters***

Dealers sold more Arvins last year than ever before—and this year, sales are going up to another new high. Because the market is bigger and more receptive. More people appreciate the need for an Arvin—and more are able to buy. So don't miss this opportunity for extra profit. Order your initial stock from an Arvin jobber now—and cash in on the early sales.

NOBLITT-SPARKS INDUSTRIES, INC., COLUMBUS, INDIANA

MECHANICAL SPECIFICATIONS OF HEATERS

Operate on AC only, 50 to 60 cycles, 110 to 125 volts.

Heating Element, nichrome helical coil with moulded porcelain supports.

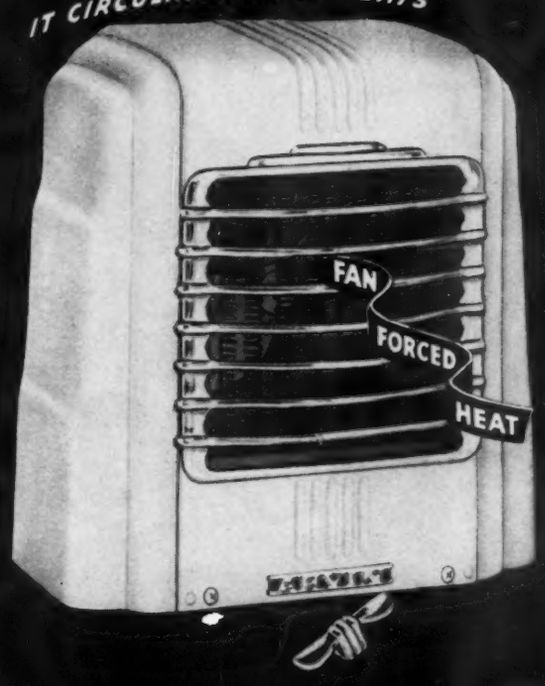
Motor, induction type does not interfere with radio.

Fan, 2-blade propeller type.

Housing, heavy gauge steel with rubber feet.

Approved by Underwriters' Laboratories

IT CIRCULATES AS IT HEATS



ARVIN CONSUMER ADVERTISING in all the leading national magazines shown above help you sell. Other effective sales helps given free to Arvin dealers include: Counter-window display card, beautifully printed in colors, and prospect-selling folders to hand out or mail with statements. Ask your Arvin jobber for this free material that links you up with the millions of Arvin consumer messages in the national magazines.

Deluxe Model 201A above. Ivory enamel finish, maroon trim. Chrome grille. Toe switch and glow light. 12" tall. List **$12.50**

Model 201, same design and size with tan finish, brown trim. List.. **$11.50**

Standard Model 101 at left. Smaller size, 10" tall. Two-tone green enamel. List..... **$9.50**

Selling Points for You...

Warms Air Completely—drawing in cold air from floor, heating it and fan-forcing it into room.

Circulates Heat—employing efficient fan-distributing principle.

Portable—plugs in any 110 AC, 60 cycle outlet. Safe with children.

ARVIN

FAN – FORCED

Circulating Heaters

ESSENTIAL FOR BATHROOMS

AND MANY OTHER PLACES

Consumer Advertising features Arvin as essential equipment for bathrooms—for bathing, shaving and dressing. It's sold for many other uses, too.

Thousands Sold every year for trailers, camp cottages, small offices, ticket booths and many other places.

"It's a money-saver on...or off the pole!"

Greater dependability . . . cost-cutting operation? Yes! And the new Allis-Chalmers Distribution Transformer . . . with its six big engineering features . . . is a money-saver *before you ever put it on the pole!*

First of all, standardized locations of supports and bushings make all sizes and types completely interchangeable. That means your specifying and buying are easier . . . deliveries faster!

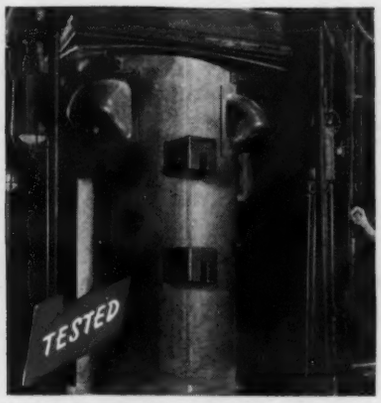
It also means you have fewer parts and fewer complete units that must be carried in stock. And there's a big saving in installation time and expense!

What happens after it's on the pole? The

AC ALLIS-CHALMERS DISTRIBUTION

REASONS WHY ENGINEERS CHOOSE THE NEW ALLIS-CHALMERS DISTRIBUTION TRANSFORMER

1 Simplified Supports for Direct Pole Mounting Cut Installation Time. Standard Support Spacing and Bushing Location Mean Complete Interchangeability of All Sizes and Makes.

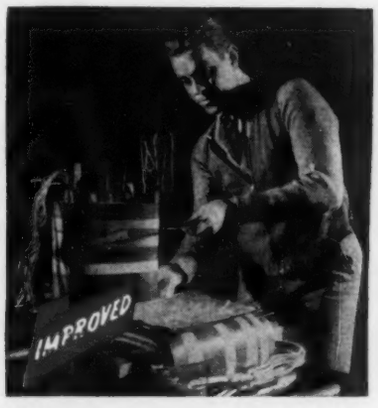


2 New, Durable, Copper-Bearing Steel Tanks. Tested Under Pressures Far Greater than Normal . . . Prevent Oil Leakage, Assure Long Life and Complete Safety.

3 New Spra-bonderizing Process . . . Plus Triple Coat Automobile Finish Give Tanks Positive Four-way Protection Against Attacks of Rust and Corrosion.

4 Extra-heavy Porcelain Coordinated Bushings with Liberal Creepage Offer Maximum Reliability Under Fog, Dust, Chemical or Other Adverse Conditions.

5 Double Conductor Insulation . . . Flexible Enameled Wire . . . Plus the Added Protection of Well-Lapped Cable Paper Provide Double Safety Against Winding Failures.



6 Improved Core and Coils, Liberally Designed with No Manufacturing Short Cuts . . . Mean Extra Years of Service-free Performance Under All Types of Operating Demands.

photographs shown here tell their own story of built-in quality second to none . . . with no manufacturing short cuts!

Tested-under-pressure tanks . . . new spra-bonderizing plus triple coat automobile finish . . . extra heavy bushings . . . double conductor installation . . . improved core and coils — all add up to cost-cutting reliability for you!

Bulletin B6159 gives complete engineering information about the new Allis-Chalmers Distribution Transformer. Write for your copy . . . *today!*

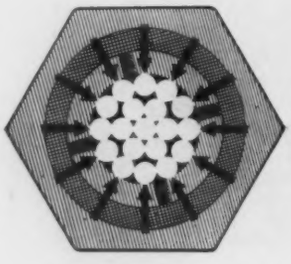
A-1488

TRANSFORMERS *Cut Operating Costs*

You can't make a good water connection by pressing at two points.

But give it a good "Gorilla Grip" all around and you will have a tight positive connection.

The same applies to mechanical electrical connectors.



Cross Section of "Gorilla Grip" Connector

National Electric "Gorilla Grips" have 100% all around contact - not just two spots.

Pressure is uniformly distributed over full contact area of the Conductor and there is a "Gorilla Grip" for every Conductor, no matter where it terminates. "Gorilla Grips" can be used over and over again Emergency stock sets available or assembled to meet your needs with required fittings.

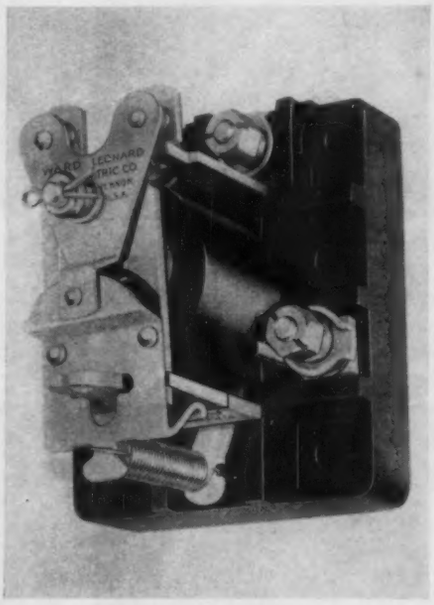
Write for descriptive booklet.

National Electric
PRODUCTS CORPORATION
1300 Fulton Bldg. Pittsburgh, Pa.

PRODUCTS
that are news

Midget Relay (1100)

Ward Leonard Electric Co. has developed a midget magnetic relay available for use on either ac- or d-c which can be equipped with single or double pole and single or double throw contacts. Standard features of the unit are either a-c or d-c operation, continuous duty,



low power consumption coil; coils for operation directly on standard voltages and frequencies up to 115 volts; silver-to-silver, self-cleaning and self-aligning contacts and two or three wire control.

Refrigerated Welding (1101)

Designed to increase productivity of resistance welding equipment in welding of aluminum and stainless steel, a line of refrigerating units for welding machines is announced by the Progressive Welder Co. The unit, according to the manufacturer, makes possible continuous welding of four to ten times as many spots in aluminum without requiring point dressing. When used in combination with a spot welding machine, the unit reduces electrode temperature to a point where electrodes will be continuously covered with frost.

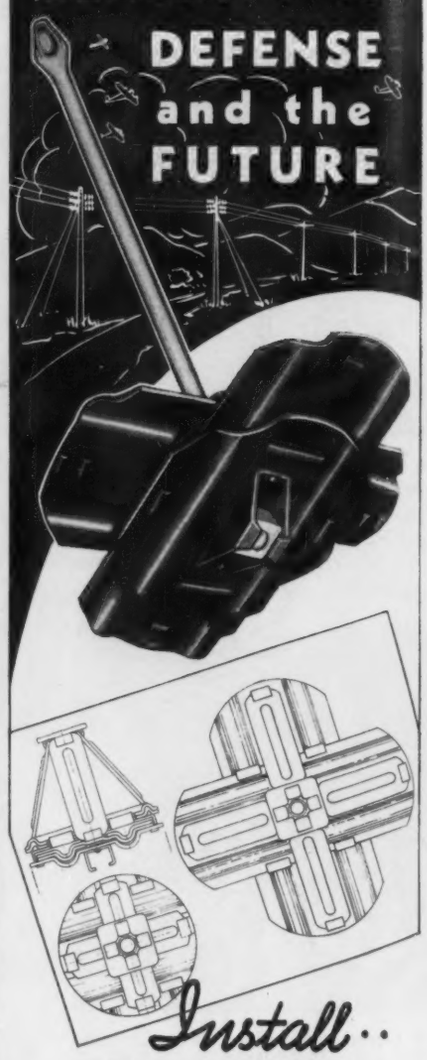
Limit Bridge (1102)

Shallcross Mfg. Co. has designed a specialized Limit Bridge for rapid and accurate testing of multi-tapped resistances with varying unit values. This bridge has binding posts for connecting a galvanometer and battery, special mercury wells providing method for attaching a multi-tap resistance resistor. A special rotary switch selects the unit of the multi-tap to be tested and at the same time places the proper standard in circuit. A suitable key switch tests the tap for high and low tolerance.

F Starter (1103)

A new fluorescent starter, to be known as the Protector-Starter, is under development by the accessory equipment section of General Electric appliance and merchandise department. The unit is designed to eliminate blinking fluorescent lamps by automatically

To build LINE SECURITY for DEFENSE and the FUTURE



Install..

Chance STEEL EXPANDING ANCHORS

Chance Steel Expanding Anchors do an important job for both defense and the future. They protect many miles of power lines against the blitz of time and the elements and help to maintain the constant uninterrupted service that is, and will continue to be, so vital.

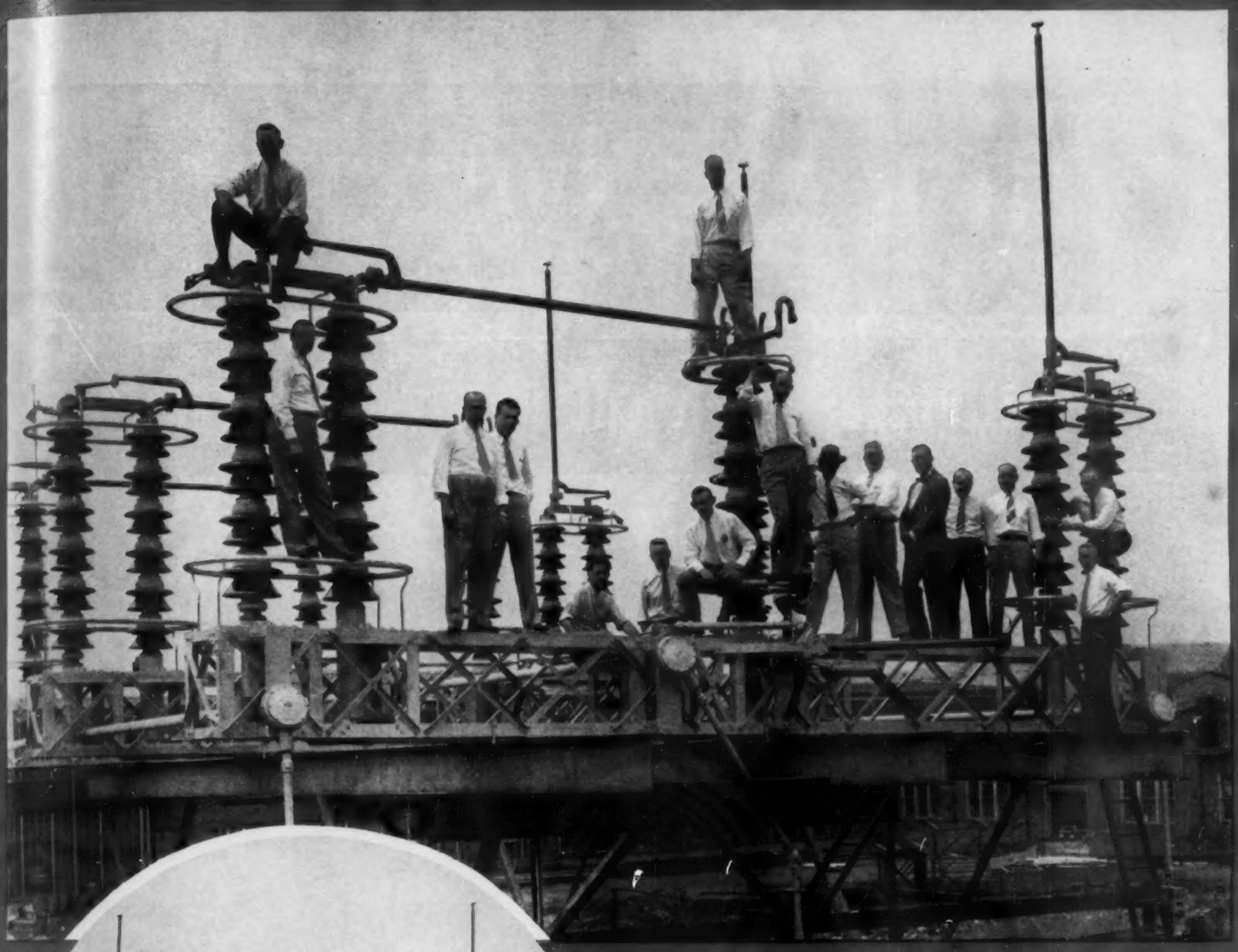
They are the most widely used of all expanding anchors because—

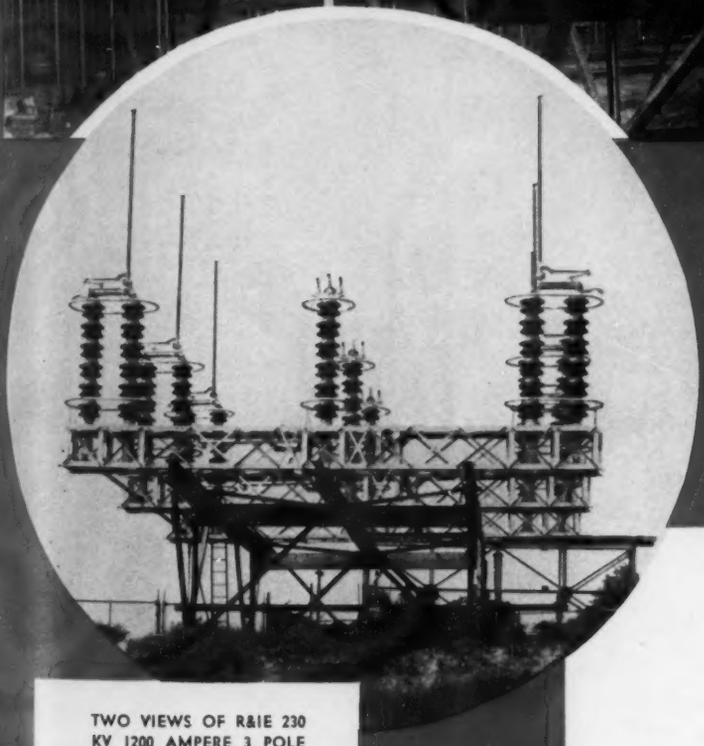
- They are available in sizes from 6 to 12 inches diameter for 2 or 4 way expansion, and have a rated holding power ranging from 3000 to 42,000 pounds.
- They expand to more than twice their size giving extra area in solid earth, and are adaptable to clay, loam, sand, or hardpan.
- The all steel construction withstands severe punishment without danger of breaking or coming apart.
- Blades won't slip out of place during installation.
- Destructible nut retainer prevents anchors from riding up the rod and permits rod salvage or abandonment.
- Rigid connections, grooved blades and base plates make it impossible for rocks, rock, etc. to throw blades out of line.
- Blades expand in opposite directions equalizing pull strain and preventing side twisting or shifting.

Build security into your lines with Chance Steel Expanding Anchors. They make secure the power needed for defense and the future.

WEC

A·B·CHANCE CO. CENTRALIA MISSOURI





TWO VIEWS OF R&IE 230 KV 1200 AMPERE 3 POLE TYPE TTR-5 TANDEM DISCONNECTING SWITCHES:

R&IE

HI-PRESSURE CONTACT *Switches*

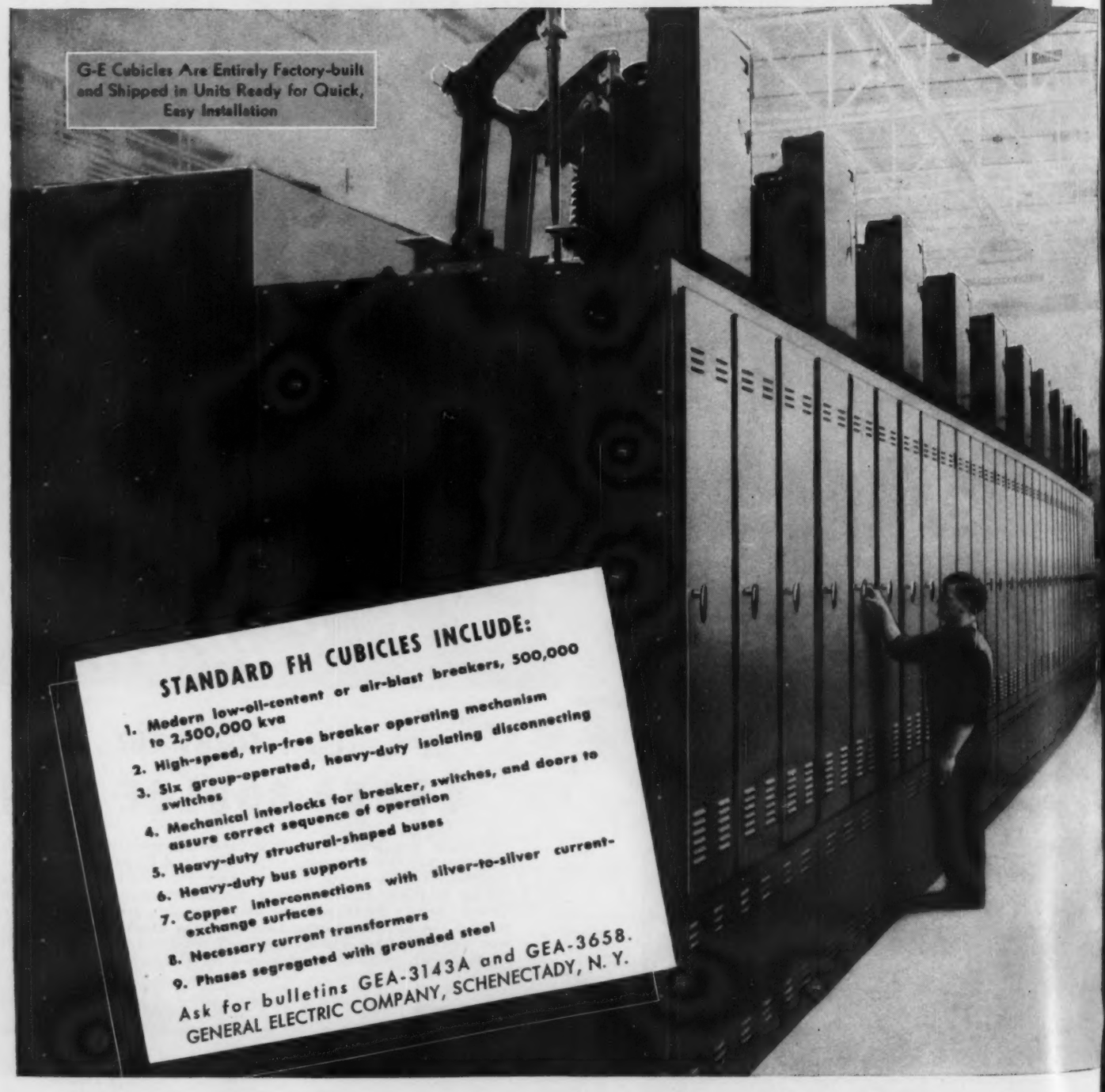
. . . ready for GRAND COULEE DAM

All R&IE switches are built to exacting specifications which accounts for the ease with which *standard* Hi-pressure contact switches, shown above on test, met the strict requirements set up by the engineers for the Grand Coulee project. In the future specify R&IE with the assurance that you will not only receive the best appearing switch on the market but in addition you will have a switch so well constructed that you will obtain extra years of trouble-free service.

RAILWAY AND INDUSTRIAL ENGINEERING CO. GREENSBURG, PA.

This Is THE SWITCHGEAR

FH CUBICLES with OIL-BLAST BREAKERS



STANDARD FH CUBICLES INCLUDE:

1. Modern low-oil-content or air-blast breakers, 500,000 to 2,500,000 kva
2. High-speed, trip-free breaker operating mechanism
3. Six group-operated, heavy-duty isolating disconnecting switches
4. Mechanical interlocks for breaker, switches, and doors to assure correct sequence of operation
5. Heavy-duty structural-shaped buses
6. Heavy-duty bus supports
7. Copper interconnections with silver-to-silver current-exchange surfaces
8. Necessary current transformers
9. Phases segregated with grounded steel

Ask for bulletins GEA-3143A and GEA-3658.
GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y.

for ANY POWER STATION

FH CUBICLES with AIR-BLAST BREAKERS

Compact, Segregated-phase Switchgear—a Complete Installation in Itself

FOR POWER-STATION SERVICE up to 23,000 Volts and 2,500,000 Kva

GENERAL ELECTRIC

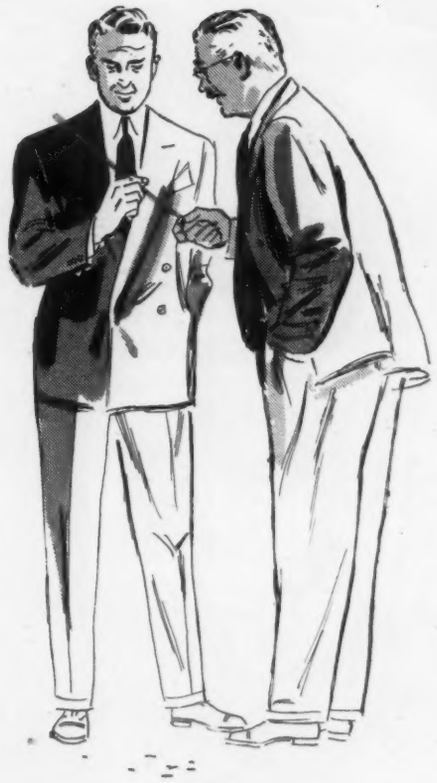
safeguards the wheels of industry

● Urgent demands for production emphasize the need for dependable power in every phase of industry — raw material production, manufacturing and transportation.

The uniformity and exceptional commutating properties of "NATIONAL" Carbon Brushes have earned for them a reputation for outstanding reliability which is your best assurance of dependable power on electrified equipment.

SPECIFY NATIONAL BRUSHES
TRADE-MARK

NATIONAL CARBON COMPANY, INC.
Unit of Union Carbide and Carbon Corporation
UCC
CARBON SALES DIVISION, CLEVELAND, OHIO
General Offices: 30 East 42nd Street, New York, N. Y.
BRANCH SALES OFFICES
New York Pittsburgh Chicago St. Louis San Francisco



"We are helping to CONSERVE COPPER by using Copperweld"

TODAY when defense needs have made copper practically a precious metal, many engineers are specifying copper-saving Copperweld. The steel core of Copperweld wire provides mechanical strength. The copper need only do the job that copper does best — conduct electricity.

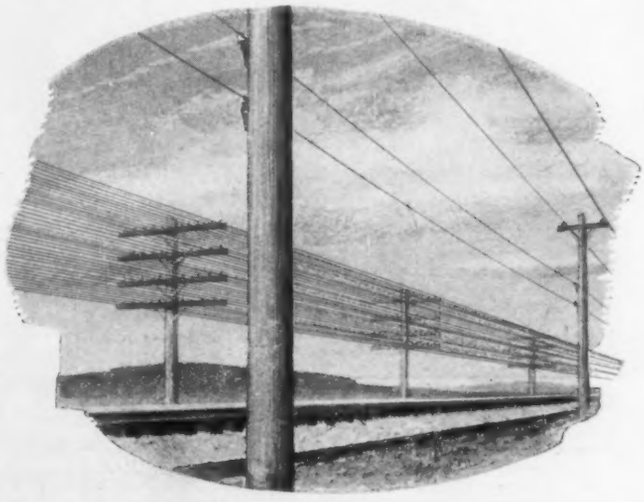
Typical applications of copper-saving Copperweld are: power conductors for electric transmission and distribution systems, telephone line wire, telephone drop wire, telephone interior wiring, railroad signal line wire, railroad telephone line wire, and telegraph line wire.

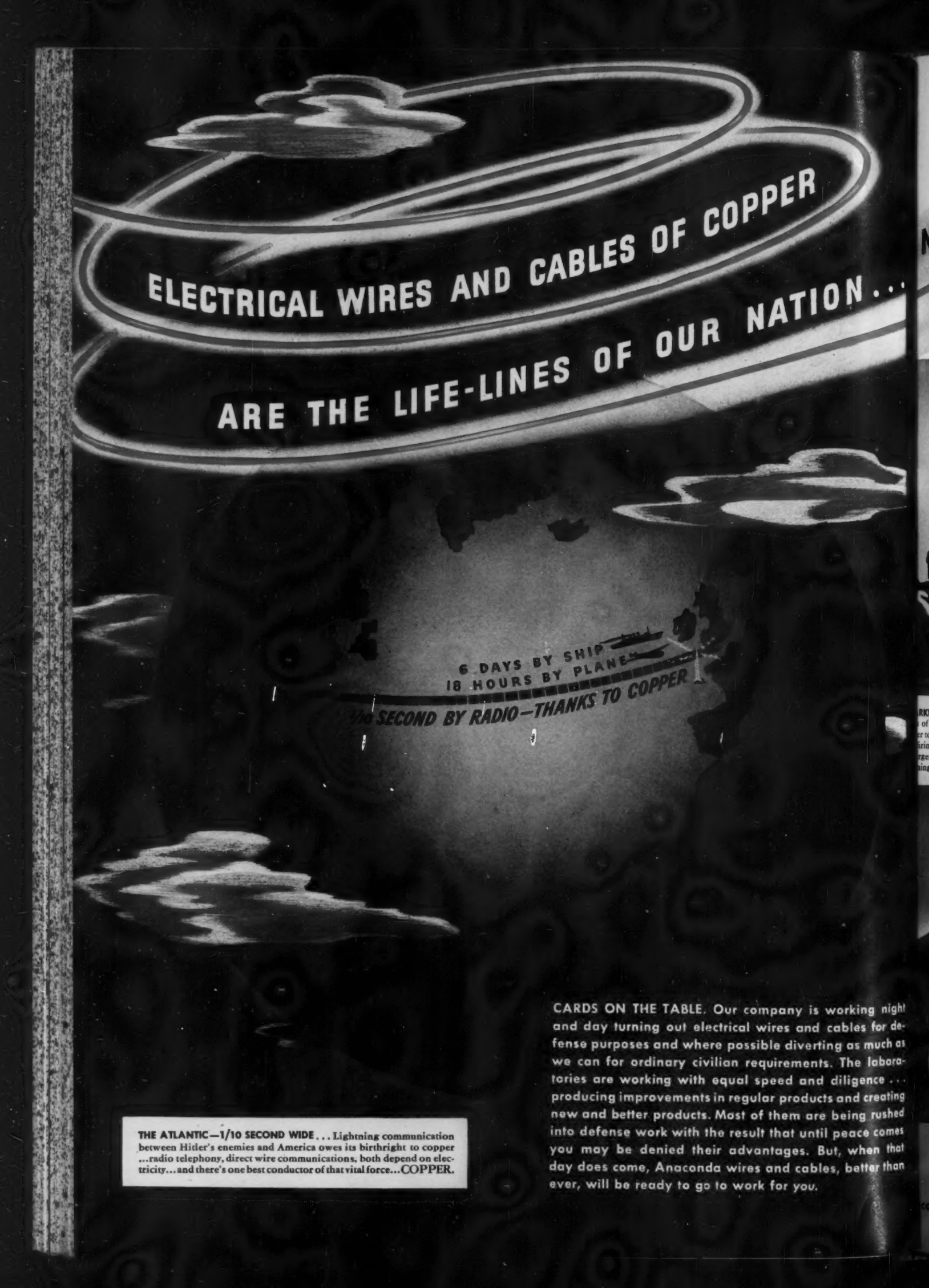
Copperweld wire may also be used for many mechanical and non-electrical applications where brass or bronze wires have been employed.

COPPERWELD STEEL COMPANY, GLASSPORT, PENNA.

Pacific Coast Representative: C. E. INGALLS · RIALTO BUILDING · SAN FRANCISCO, CALIFORNIA

COPPERWELD AND COPPERWELD-COPPER CONDUCTORS CONSERVE COPPER



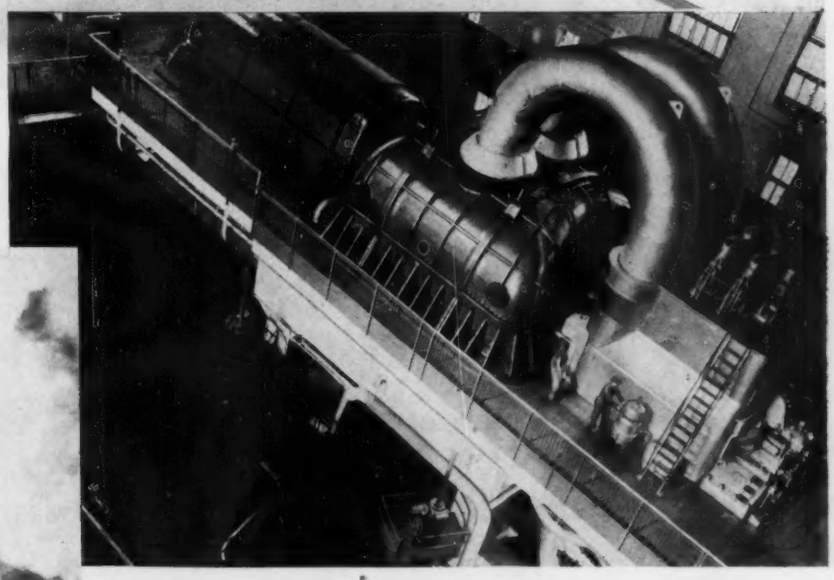

ELECTRICAL WIRES AND CABLES OF COPPER
ARE THE LIFE-LINES OF OUR NATION...
6 DAYS BY SHIP
18 HOURS BY PLANE
1/10 SECOND BY RADIO—THANKS TO COPPER

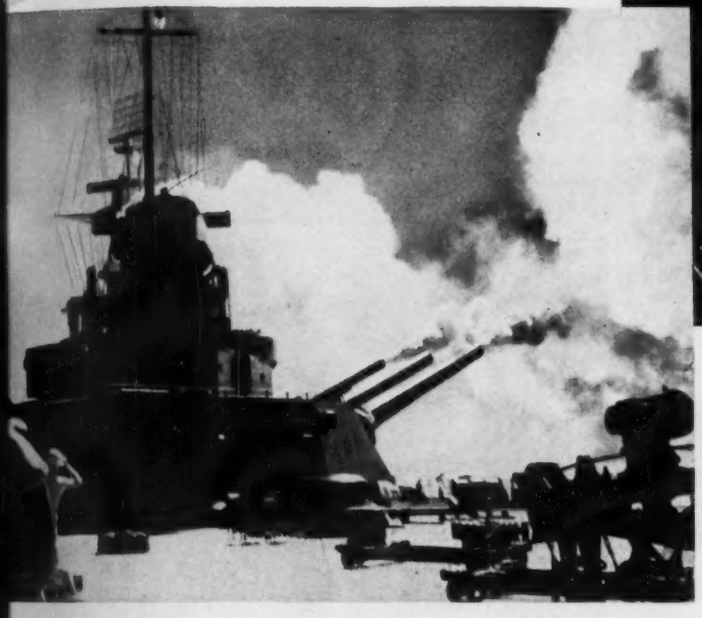
THE ATLANTIC—1/10 SECOND WIDE... Lightning communication between Hitler's enemies and America owes its birthright to copper ...radio telephony, direct wire communications, both depend on electricity...and there's one best conductor of that vital force...COPPER.

CARDS ON THE TABLE. Our company is working night and day turning out electrical wires and cables for defense purposes and where possible diverting as much as we can for ordinary civilian requirements. The laboratories are working with equal speed and diligence ... producing improvements in regular products and creating new and better products. Most of them are being rushed into defense work with the result that until peace comes you may be denied their advantages. But, when that day does come, Anaconda wires and cables, better than ever, will be ready to go to work for you.

PRINT IN BINDING

N DEFENSE... IN INDUSTRY!





WHERE DEFENSE BEGINS. Airplanes make the headlines and tanks and battleships make the rotogravure sections, but there's something that must come first ... and that's the power to turn them out. *Power* is basic. It makes wheels turn, it is essential to American industry. From gigantic turbines like this one, amazing amounts of electrical energy are transmitted to war-essential industries through copper wires and cables. Without the copper conductors, power would be bound and immovable.

FIRST IN THE EYES OF THE WORLD. American aviation produced not only this giant, the Douglas B-19, but also faster pursuit planes, interceptors with lightning climbing speed and dive bombers that out-Stuka the Stukas. In each, there is a network of copper wires and cables carrying electricity to delicate flying instruments, to ignition systems that fire motors turning up over 1600 Hp. In the B-19, for example, there are seven miles of copper wires and cables.

RKING 2 1/2 TONS OF TNT. Nine 16" rifles and ten five-inchers belch 10 of steel from the U.S.S. North Carolina. 2½ tons of TNT exploded in r to hurl this lethal barrage. Copper cable carried the electrical impulse to ring point; copper wired fire alarm systems stood "at the ready" in case of rgency. In fact, over 2,000,000 pounds of copper were aboard the "Ency" per- ing scores of vital tasks to help make it the most powerful war vessel afloat.

THE VOICE HEARD 'ROUND THE WORLD. It's the voice of American industry. It directs the gigantic defense effort through copper wires and cables ... through the telephone ... through plant intercommunication systems ... in fact, through a network of copper nerves. And when the voice said "full speed ahead," the ears of the world listened attentively, eagerly. 41277

Anaconda Wire & Cable

ANACONDA

conda Wire & Cable Company • General Offices: 25 Broadway, New York City • Chicago Office: 20 North Wacker Drive

A Subsidiary of Anaconda Copper Mining Company • Sales Offices in Principal Cities

100%!

THAT'S THE CONTACT LIFE RECORD SET BY ALLIS-CHALMERS STEP REGULATORS

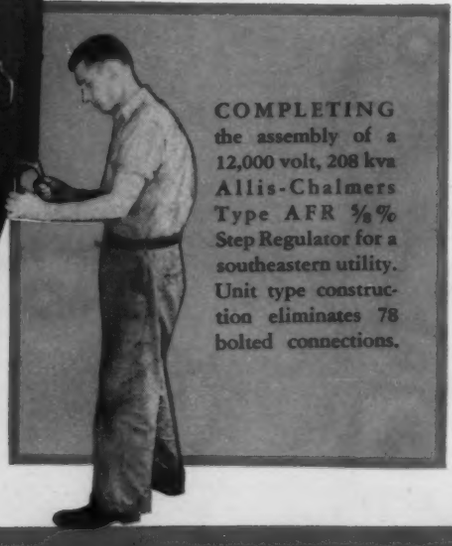
UNRETOUCHED PHOTOGRAPH of Allis-Chalmers Type AFR Regulator contacts after 2,000,000 tap changing operations. Note the lack of appreciable wear.

Regulating More Than 4,000,000 Kva in the Past Eight Years . . . One Answer to Better Regulation at Lower All-Around Costs!

In September, 1933, the first Allis-Chalmers 5/8% Step Regulator went into service. Today, eight years later, these modern regulators are delivering better regulation at lower all-around cost on 4,000,000 kva all over the country.

And, at the time this advertisement went to press, *not a single contact on an Allis-Chalmers Step Regulator had ever been replaced due to deterioration under normal operation!*

When the Allis-Chalmers engineers designed this regulator, the 5/8% steps . . . Half-Cycling operation . . . use of RS-1026 metal — all were incorporated to give you a mechanism capable of withstanding millions of operations over long years of actual service.



COMPLETING the assembly of a 12,000 volt, 208 kva Allis-Chalmers Type AFR 5/8% Step Regulator for a southeastern utility. Unit type construction eliminates 78 bolted connections.

Now Allis-Chalmers offers you something different in three-phase regulators — unit type construction that *eliminates 78 bolted connections!* And there are no leads in air to absorb moisture.

Equally important, the Allis-Chalmers 5/8% Step Regulator is the only three-phase regulator with all voltage control relay adjustments conveniently located to save your operators' time and temper.

Bulletin B6056 gives complete engineering information on the Allis-Chalmers Type AFR 5/8% Step Regulator. Write for your copy...*today!*

A 1440

ALLIS-CHALMERS

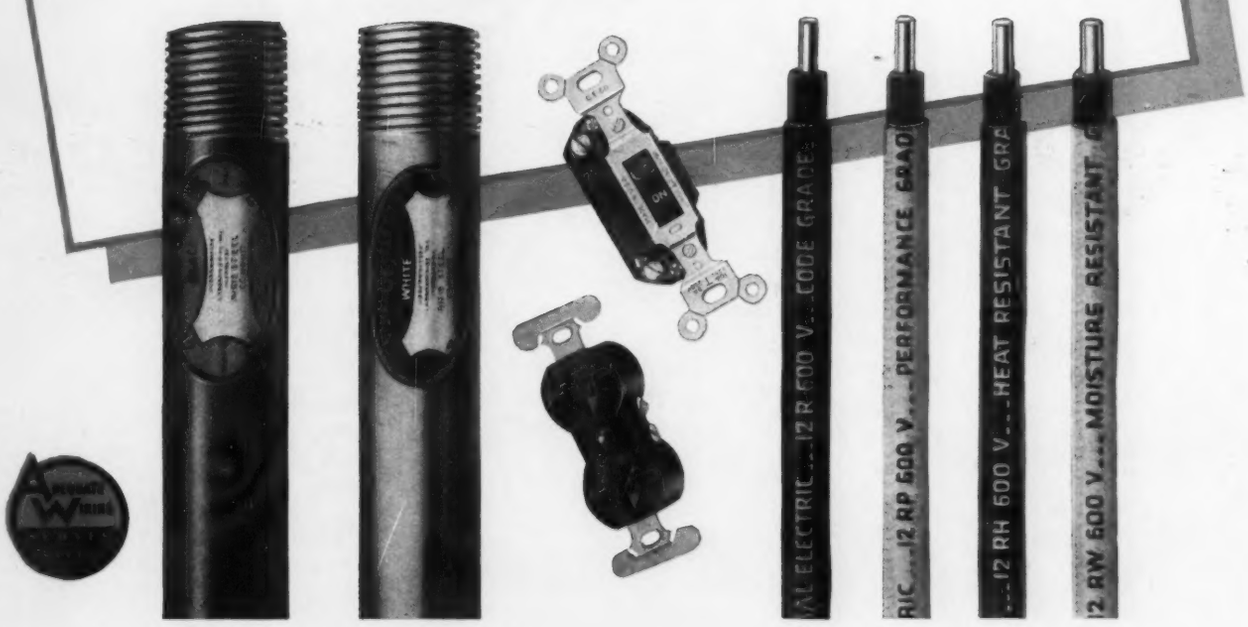
MILWAUKEE · WISCONSIN

These 5/8% Step Regulators Are Famous for Better Regulation at Lower Cost! Choose the Regulator to Fit Your Purpose!

DFR — 12 to 250 kva, single phase
AFR — 20.8 to 750 kva, three phase
CFR (air cooled) — 36-96 kva, 2400 volt, single phase

G-E Wiring Materials for New Wiring—Rewiring—Maintenance

- Complete line
- High quality
- Distributors at all key points in country



Whatever type of job you're handling, you'll find suitable wiring materials in the G-E line. It contains white conduit, black conduit, flexible conduit, E.M.T., Fiberduct, Types R, RP, RH, RW and SN building wires, boxes and fittings, switches, outlets, sockets, plates, etc.

The quality of all G-E wiring materials is high. Only the finest of raw materials are used. Rigid specifications are met in manufacturing. These materials are designed to be used together and are easy to install. They will give long dependable service.

For further information see the nearest G-E Merchandise Distributor or send the coupon below for a catalog.

General Electric Co., Section CDW-118A
Appliance and Merchandise Dept.
Bridgeport, Conn.

Sirs: Please send me the G-E Wiring Materials Catalog, 51-4115

Name..... *Company*.....

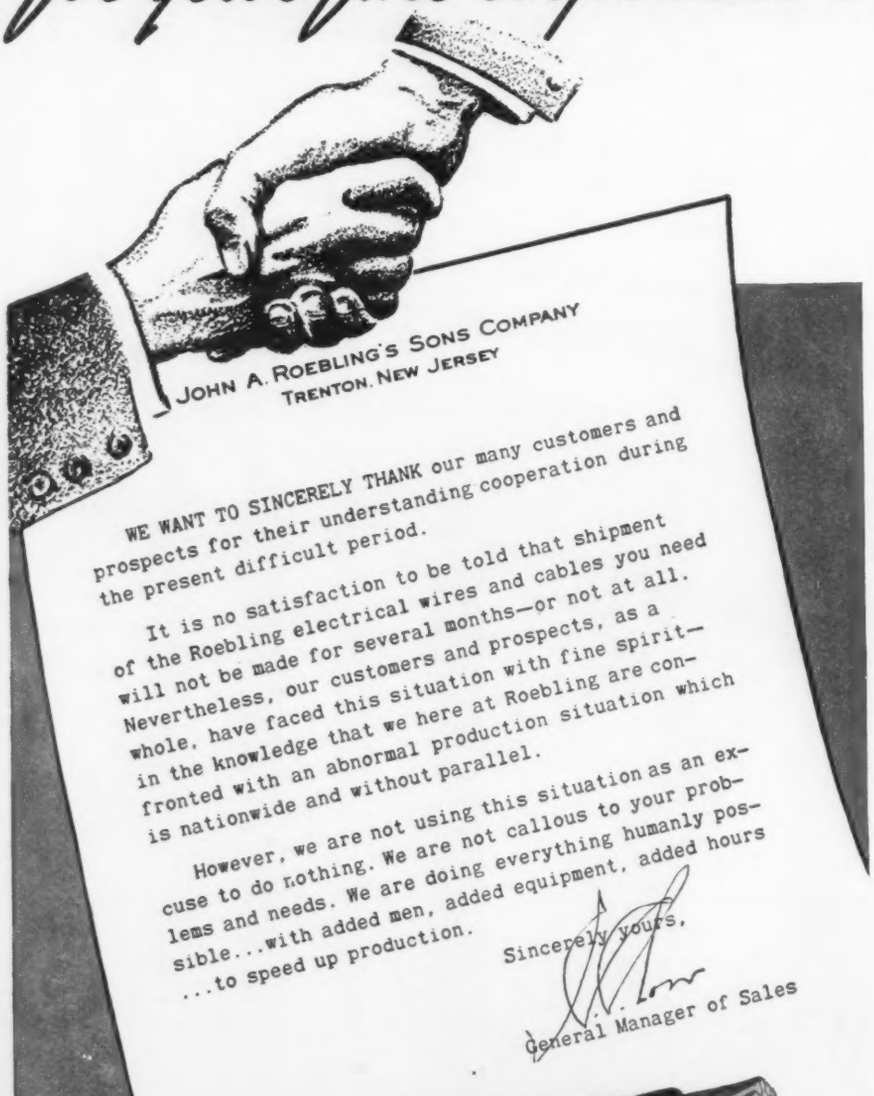
Address..... *Title*.....

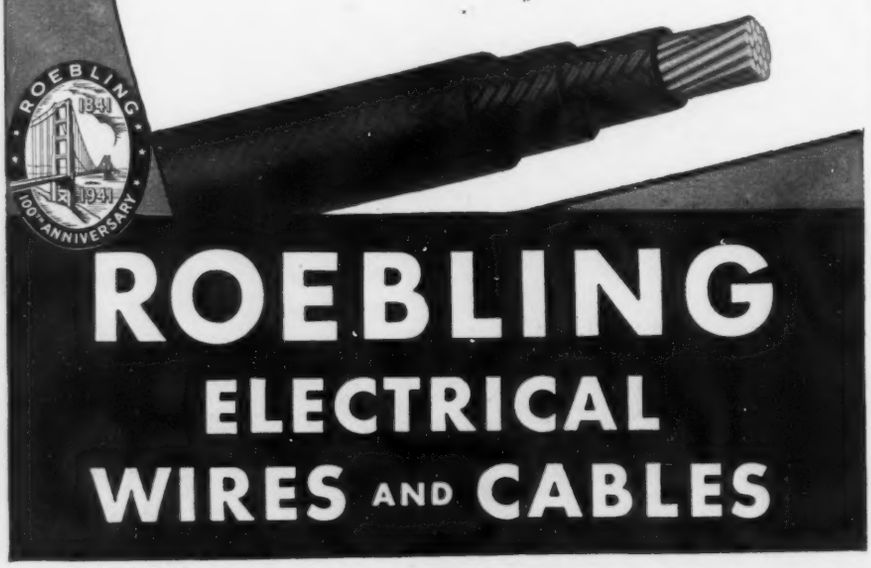
City..... *State*.....

GENERAL ELECTRIC

THANK YOU

for your fine cooperation


JOHN A. ROEBLING'S SONS COMPANY
TRENTON, NEW JERSEY
WE WANT TO SINCERELY THANK our many customers and prospects for their understanding cooperation during the present difficult period.
It is no satisfaction to be told that shipment of the Roebling electrical wires and cables you need will not be made for several months—or not at all. Nevertheless, our customers and prospects, as a whole, have faced this situation with fine spirit—in the knowledge that we here at Roebling are confronted with an abnormal production situation which is nationwide and without parallel.
However, we are not using this situation as an excuse to do nothing. We are not callous to your problems and needs. We are doing everything humanly possible...with added men, added equipment, added hours ...to speed up production.
Sincerely yours,
General Manager of Sales

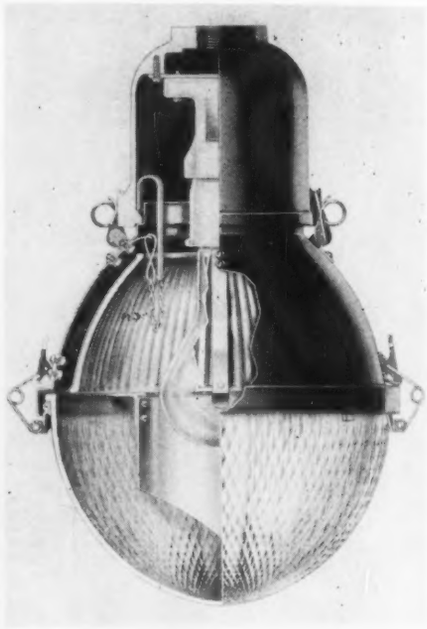


ROEBLING
ELECTRICAL
WIRES AND CABLES

cutting them out of the circuit. This action prevents the starter from destroying itself in trying to start a defective or worn-out lamp. It may also save ballast equipment by eliminating the possibility of a closed circuit condition creating excessive temperature rise. First installation of the new device has already been made and is being field-tested in a large factory.

Street Lighting Unit (1104)

Line Material Co. has designed a new street lighting luminaire which uses a glass prism reflector in place of a metallic reflector. The prismatic glass reflector is designed to reflect the light efficiently onto the street in the most



useful directions and offers high light output, permanent efficiency because glass is an inert material, is economical in maintenance. The unit is known as the Prismalite and is available for symmetric or 4-way light distribution with lamps up to and including 500 watts or 10,000 lumens.

Primary Cutout (1105)

For use on a.c. circuits up 12,500 volts where fuse requirements do not exceed 50 amp., a new primary fuse cutout has been developed by Westinghouse Electric & Mfg. Co. Known as type EA, cutouts are housed with Prestite porcelain that has high dielectric properties and is moisture-proof. All contacts are coated with silver to assure low contact drop, and the fuse tube is made of fibre lined duck Micarta that is moisture

HOW TO CUT DOWN

ORDERING TIME • DELIVERY TIME
INSTALLATION TIME
ON METAL-ENCLOSED SWITCHGEAR

"Unitized" Westinghouse designs now make metal-enclosed switchgear available in cost-saving, standardized sections.

"Unitized" switchgear enables you to get switching and protective equipment which does not require time-consuming special engineering and costly custom-built designs.

Just check the units wanted, for LOW-VOLTAGE METAL-ENCLOSED SWITCHGEAR with Draw-Out Air Circuit Breakers. Thirteen Basic Units meet all main and feeder breaker requirements up to 600 volts; 15 to 6,000 amperes; 15,000 to 100,000-ampere interrupting capacity.

Basic Units 1, 9, 11 and 12 make up this low-voltage metal-enclosed switchgear installation.

Westinghouse

"UNITIZED" SWITCHGEAR

RELATED PROTECTION . . . FROM

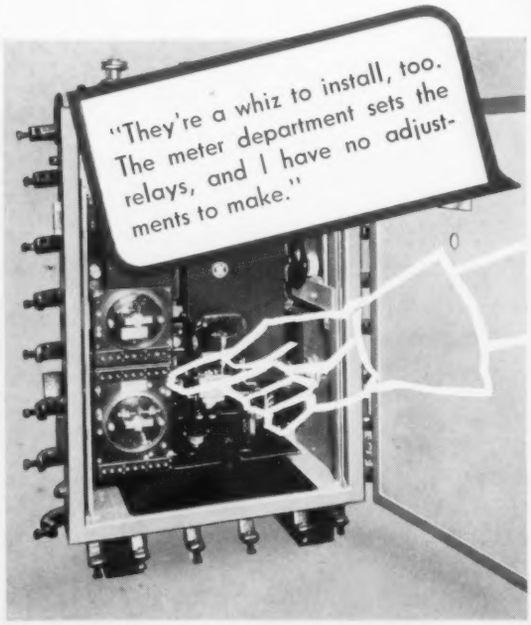
"ME?--

"When you spend a big part of every day in as cramped quarters as most underground vaults, you just naturally go for equipment as compact as that CM-22."

"here's why..."

"No wires to disconnect to take off a motor or shunt trip either—just two more 'captive' bolts. Whoever thought up that 'captive' hardware sure had me in mind!"

"They're a whiz to install, too. The meter department sets the relays, and I have no adjustments to make."

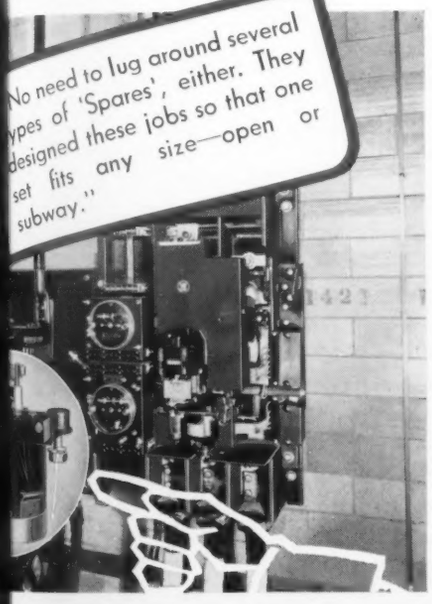


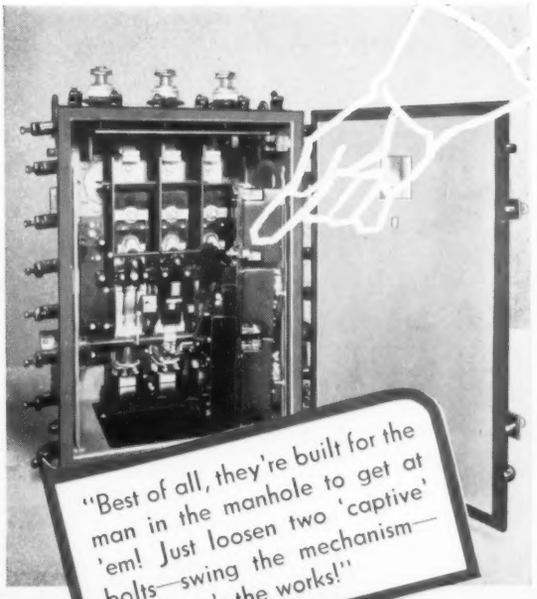
"—AND—the boss tells me the new ones now have more interrupting capacity and cost no more. What interests ME most is that these new protectors are identical with the old ones as far as my job is concerned!"

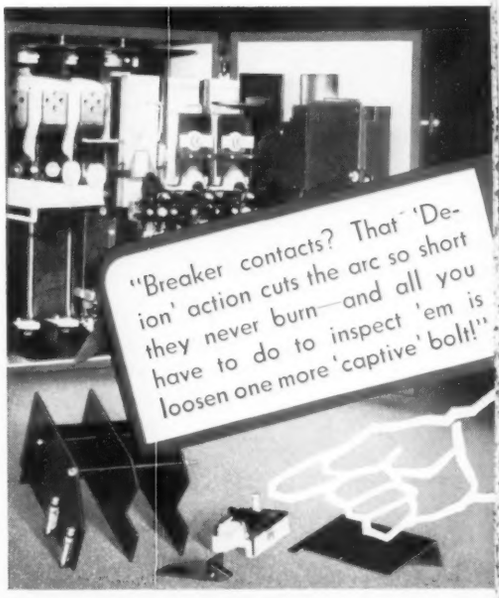
WESTINGHOUSE ELECTRIC

Westinghouse

I'll take Westinghouse Network Protectors!"

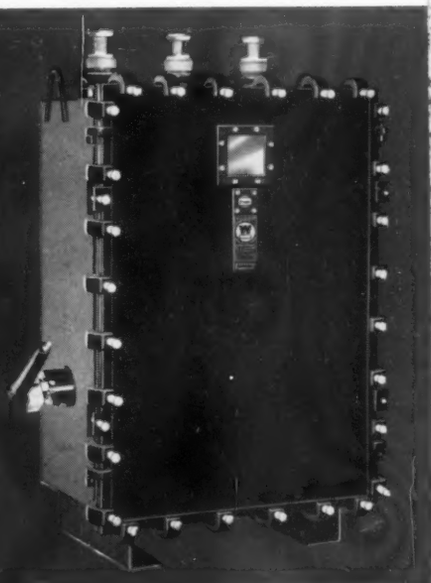



"Best of all, they're built for the man in the manhole to get at 'em! Just loosen two 'captive' bolts—swing the mechanism—and there's the works!"


"Breaker contacts? That 'De-ion' action cuts the arc so short they never burn—and all you have to do to inspect 'em is loosen one more 'captive' bolt!"

The "man in the manhole" and power company engineers alike agree on Westinghouse CM-22 Network Protectors . . . because they were designed to the operating department's ideals.

Addition of 2,500 and 3,000 ampere ratings for open or vault type units, with interrupting capacities up to 40,000 amperes, now makes the compact CM-22 line available in the entire range of ratings from 800 amperes, 250 volts, to 3,000 amperes, 250 volts. Why not get the full story? Ask your Westinghouse representative or write Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa., Dept. 7-N.



J-60120-B

Network Protectors

PRINT IN BINDING

A NEW CUTOUT

WESTINGHOUSE TYPE EA

A FUSE CAN BE REPLACED WITHOUT TOUCHING THE HOUSING

EA cutouts are available in 5 and 7½ kv ratings, 50 amperes maximum, drop-out and non-drop-out types.

The new Westinghouse EA cutout is improved in every respect. It brings greater safety to linemen because fuse links can be replaced away from hot lines. Drop-out is positive, with minimum strain on fuse links. The housing is made of a newly developed material, Prestite. The current path is short and direct, with no joints to loosen or heat up.

EVERYTHING CHANGED BUT THE FUSE LINK

Housing—made of the new Westinghouse developed Prestite—has dielectric and mechanical strength of wet-process porcelain—the dimensional fidelity of dry-process porcelain—is absolutely moisture-proof.

Door—made of high-strength Westinghouse Moldarta, chocolate in color to match housing. Unusually large hook-eye is molded integrally.

Contacts—heavily silver-plated contacts are standard; assure permanent, low contact drop.

Fuse Tube — non-warping, strong, moisture-resisting duck Micarta lined with fiber.

Fuse Holder — captive nut tightens link cable against knurled surface; nonrotating washer prevents capstan action and resultant strain on link.

Mounting—angle swivel bracket permits turning cutout toward pole; heavy knurled clamping surface prevents turning, once tightened. Adjustable bracket fits any standard size crossarm.

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY
EAST PITTSBURGH, PA.

J-60473

Westinghouse

FUSE CUTOUTS

ING

every
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LINK

rping,
duck

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PANY

J-60473

Professional People
SAVE VALUABLE TIME WITH OUR MAIL SERVICE

Every year more and more doctors, lawyers, engineers, dentists are using our Bank-by-Mail Service. It enables them to do their banking when most convenient, day or night, at home or in the office.

Write today for information.

CROCKER FIRST NATIONAL BANK
OF SAN FRANCISCO
California's Oldest National Bank

Member Federal Deposit Insurance Corporation

resisting. A toggle mechanism provides drop-out action of the door to indicate a blown fuse. Line leads can be inserted easily and any size stranded wire from the smallest to zero solid or number 1 stranded can be inserted and held by means of two 5/16-in. screws.

Heat Pad (1106)

Landers, Frary & Clark have developed a carefully constructed, rigidly tested heating pad for use with either wet or dry applications. The Universal heating pads are specially designed with a tie-on tape for attaching the pad securely to any part of the body and contain an exclusive 3-heat control.

Four separate automatic heat-regulating thermostats of three different temperatures; high 185 deg., medium 150 deg., low 115 deg. are controlled by a switch in the permanently attached 9-ft. cord. There is one thermostat for each temperature with an extra thermostat as a safety check on all three.

No Aluminum (1107)

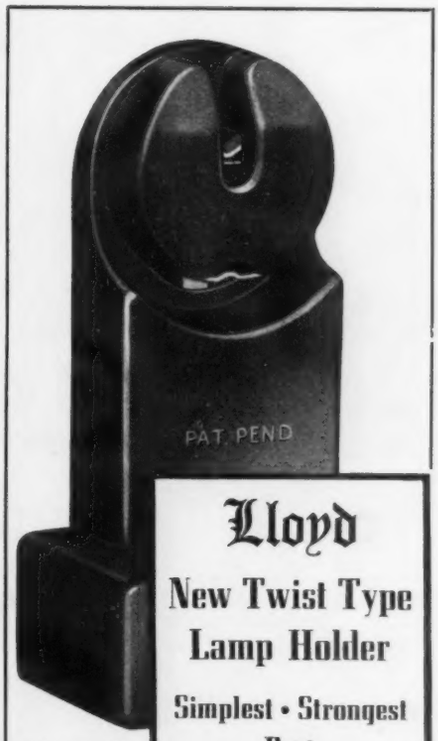
Eliminating aluminum for reflectors, two redesigned heat lamps are announced by General Electric appliance and merchandise department. This problem has resulted in a new infra-red lamp bulb with self-contained reflector and fixtures. The unit is a 250-watt, 115-volt lamp with a mushroom shaped bulb providing a reflector behind the filament. Sealed within the bulb, the reflector is protected from tarnishing and its original condition is preserved to provide maximum reflection efficiency for the life of the filament.

Terminal Lugs (1108)

Penn-Union Electric Corporation has available terminal lugs with a wide variety of flange including round and square with one or more bolts, straight or angle, or side-form. These lugs have no loose parts, the conductor is simply inserted and tightened with a socket wrench.

Time Relays (1109)

The R. W. Cramer Co. have developed time relays, type RSIC and TDIC which are synchronous motor-operated timers which either keep electrical circuit closed or for a preset time interval, in the case of the TDIC, can be used as time delay relays which would energize and keep a circuit open for a selected interval. These timers, according to the manufacturer, have an instantaneous reset feature and when restarted they repeat the timing without manual resetting. They are available with in-built manual start buttons or can be supplied for remote control start buttons. Auxiliary contacts can be furnished for audible or visual signal circuits.



Lloyd
New Twist Type Lamp Holder
Simplest • Strongest Best

Pats. Pending

- **Absolutely simple, fool-proof.**
- Place **one** lamp terminal pin in slot. Twist—click—it's locked in **positive contact.** A half-turn in either direction does it.
- No strain on pins or casing.
- A tempered steel spring more than doubles strength of lock with no loss of flexibility. No jolt or vibration can loosen lamp.

Black—Cat. 351
Black Combination with Starter Socket Cat. 353

White—Cat. 351-W
White Combination with Starter Socket Cat. 353-W

"LOBSTER CLAW" DUAL LOCK
Found only in Lloyd Starter Socket. Absolute lock. Perfect contact. Can't loosen. Patent pending.

Starter Socket Cat. 252 With "Lobster Claw" Dual Lock

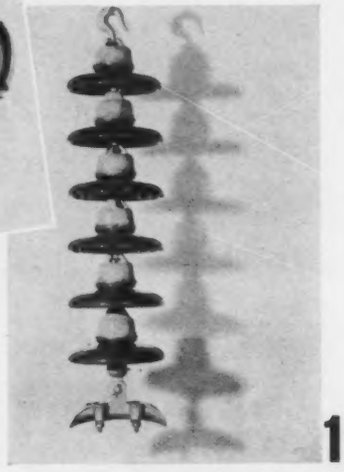
Lloyd Policy Insures Quality
Listed and Approved by Underwriters Laboratories Inc.

LLOYD PRODUCTS CO.
Box C—Edgewood Station
PROVIDENCE, R. I.

Representatives in 22 Leading Cities

Veteran Craftsmen
Made Them Both

"EARLY BIRDS"



1941

A lot of juice has gone over the wires since those "Early Birds" shown above were the last word in high tension insulators. But every improvement in utility service has found Victor ready with insulators to meet new demands. The same specialists who designed and fabricated the porcelain of a generation back are right here at Victor applying their long experience to the production of our latest types. This "old hand" expertness results in uniform quality and safe performance of every Victor Insulator . . . Glad to quote on your requirements.

V the Mark of a GOOD Insulator

VICTOR INSULATORS, INC.
VICTOR, NEW YORK

San Francisco
Portland

MAYDWELL & HARTZELL
INCORPORATED

Los Angeles
Phoenix

BULLETINS
data books, etc.

Keep Posted for 1c

Your being right up-to-the-minute may have an important bearing on your success. New developments are appearing daily in your field—tools to help you do a better job. Are you abreast of them? You fall back a step when the other fellow is well informed about a subject of which you are ignorant. Manufacturers' publications are a quick, efficient way for you to keep posted on current events in your field.

Isn't it a bargain to invest 1c (the cost of a postcard) to help earning power to which you look forward? American industry is offering a remarkable service—free. ELECTRICAL WEST makes it easy for you to enjoy this service for your own. Check and mail the coupon below. That's all you have to do to help yourself toward better performance and greater rewards.

Network Systems (1110)

For use in industrial plants and power stations, radial and secondary network distribution systems are described in a 77-page book announced by Westinghouse Electric & Mfg. Co. Covering everything from substations and switchgear to small auxiliary equipment, the book is very comprehensive and is divided into four parts: radial systems, with single transformer substation, with radial primary feeders, with loop primary feeders; banked transformer system; plant network systems; associated electrical apparatus, switchgear, metal-clad and low voltage metal enclosed, unit substations, multiple and single feeder, distribution transformers, limiter boxes, panel boards and bus ducts. Typical applications and specifications for standardized units of equipment are described and assembly drawing shows position of parts and give ratings and physical dimensions of the principal items.

All-Purpose Cleaner (1111)

A bulletin describing the Premier "Aire-Matic" "80" all-purpose, cylinder-type cleaner has been issued by the Electric Vacuum Cleaner Co. The 12-page bulletin devotes several pages to illustrations showing the various units at work in their specialized cleaning tasks.

Trade Winds (1112)

A bulletin on the centrifugal blower, electric ventilating fan, has been issued by Trade-Wind Motorfans, Inc. The bulletin illustrates the various units and dimensions are given by means of cutaway diagrams.

High-Pressure Switches (1113)

High-pressure contact "MK-39" switches for pole top and substation mounting are described in a bulletin issued by the Delta-Star Electric Co., which contains catalog numbers and dimensions for group-operated switches from 7.5 kv. to 161 kv. and ampere capacities up to 1200.

Let's be honest about it...

I'M NO lubrication "technologist." No self-respectin' Shell salesman I know of calls himself one, either!

But we salesmen do claim we know our Shell lubricants — and our Safety Factors. We're dead sure no so-called lubrication "technologist" can offer you as much.

This is a strong statement to make—even in an ad—but the facts behind Shell Safety Factors will bear me out.

You see, some of the best lubrication brains in America created Shell's Safety Factors to solve the lubrication problems of firms just like yours. That's why you can't afford *not* to know about Safety Factors.

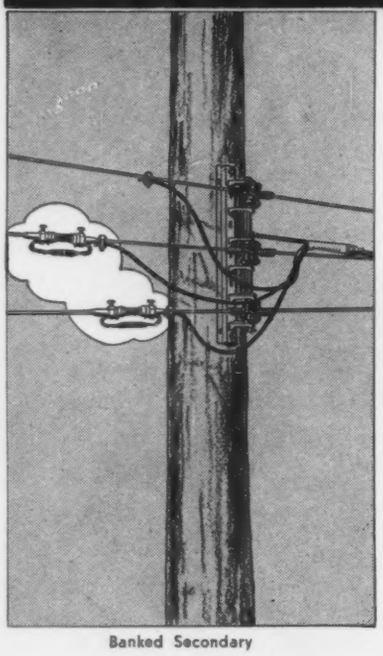
Phone the local Shell office... and I'll tell all — without wastin' your time!

Your Shell Salesman

SHELL'S SAFETY FACTORS PROVIDE

- Better control of friction heat
- Better control of combustion heat
- Slower rates of wear
- Increased power off-take
- Savings on shutdown losses
- Reduced outlay for lubricants

modernize
YOUR
DISTRIBUTION
PRACTICE—



Banked Secondary

RELIABLE INSULATED
STRAIGHTLINE
SPLICE

Reliable Insulated Straightline Splices, with neatly fitting fuse clips, simplify secondary banking.

Inserted in the line without dead-ending or cutting in additional wire. Installed on secondaries without removing wires from structure. These splices make a neat and dependable job.

A full range of sizes are available.

Reliable
ELECTRIC COMPANY
OVER 30 YEARS SERVICE TO THE UTILITIES
3145 CARROLL AVENUE · CHICAGO ILLINOIS

Deltabeston (1114)

A catalog on Deltabeston asbestos-insulated and glass-insulated wires and cables has been published by the Deltabeston sales section of the General Electric appliance and merchandise department. The catalog illustrates and describes the whole line, including power cables, switchboard wires, appliance wires, fixture wires and cords, locomotive cords and magnet wires. Technical data is given in the catalog on materials used in the manufacture of the wires and cables and on the construction of the wire.

Pump Progress (1115)

A centrifugal pump with the protection of the double seal and the flexibility of a rotatable discharge is described in a bulletin issued by the Kimball-Krogh Pump Co., a division of the Food Machinery Corp. According to the bulletin, a patented double seal eliminates the metal-to-metal contact between the impeller and the pump volute at the inlet and provides a positive wear-resistant water seal without wear to the impeller or subsequent loss of pump efficiency.

Hipersil (1116)

Distribution transformers up to 500 kva made of Hipersil, newly developed silicon steel, are described in a 22-page bulletin of Westinghouse Electric & Mfg. Co. According to the manufacturer, use of this product gives better regulation, increased flux and reduced size and weight. A description of magnetostriction tests show why Hipersil increases flux without raising the sound level. Manufacture and assembly of transformers are described and illustrated.

Low-voltage Switchgear (1117)

Low-voltage switchgear for use in central stations, industrial plants and commercial buildings are described in a new 25-page booklet released by Westinghouse Electric & Mfg. Co. The "Unitized" switchgear consists of 13 basic units that meet 600-volt main and feeder requirements. These units are illustrated and explained in detail, with diagrams showing which basic units to apply to different interrupting capacities. Circuit breakers with current ratings of from 15 to 6000 amperes and interrupting ratings from 15,000 to 100,000 amp. are described with emphasis on the draw-out construction that speeds up replacements, and, according to the manufacturer, assures maximum continuity of service. Safety features and ease of maintenance are discussed and accessories designed for metal-enclosed switchgear are described. Diagrams, physical dimensions and ordering information are given with list specifications for the 13 basic units.

Electromode (1118)

Electric Air Heater Co., Division of American Foundry Equipment Co., has a new electromode electric unit heater line featuring the Bilt-In-Wall electric heater, model WJ-15. This unit is a cabinet containing the cast-in electric safety element with no exposed hot wires or glowing elements. A motor-driven fan distributes the air uniformly throughout the room. Complete details, specifications and a series of line drawings illustrate uses that are available in a company bulletin.

Stationary Diesels (1119)

Fairbanks-Morse has published an 80-page booklet on stationary diesel installations in municipal and industrial plants. Pictorial in character, the booklet describes equipment and offers a technical resumé of merits of each installation.

F Lighting Review (1120)

Recently issued by the Wiremold Co. is a new fluorescent lighting catalog, section FL-4 and accompanying catalog and price sheet FL-58, which list and describe the new Wiremold deluxe glass-enclosed fluorescent lighting units and line-O-lamps, and in addition give preliminary price specification data on the latest Wiremold development of a 4-lamp V-type lighting unit for use with or without ornamental lamp fittings.

EASY WAY TO GET INFORMATION

To keep posted, simply circle the items in which you are interested, cut out the coupon (it can be pasted on the back of a postcard) and mail to:

ELECTRICAL WEST, 68 Post St., San Francisco, California
Please send me the following CIRCLED items:

1100 1101 1102 1103 1104 1105 1106 1107 1108 1109 1110

1111 1112 1113 1114 1115 1116 1117 1118 1119 1120

Name ..... Company*..... Title*.....

Address

* Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.

NO. 8

ALUMINUM, DEFENSE, AND YOU

OCTOBER WAS A MILESTONE MONTH

There have been three other such milestones for civilian uses of aluminum during the past 18 months.

WHEN, ON MARCH 25, 1940, the price of Alcoa Aluminum ingot was reduced from 20c to 19c a pound, it automatically increased the number of civilian applications where using aluminum would be good cost arithmetic.

19¢

Every application carries its own special set of conditions. They determine how much you can pay to save a pound of weight, to get extra heat conductivity, or reflectivity, or what not. 19-cent ingot widened the circle of aluminum's usefulness.

AUGUST 1, 1940 WAS THE SECOND milestone. Economies growing out of greater volume of manufacture, and economies stemming from continuing research, brought the announcement of 18-cent ingot. The civilian manufacturer looking to his future could see, in the offing, more ways to use aluminum than ever before.

18¢

Perhaps you were one of the thousands who filed away in your book of futures the reminder that "when this thing is over, we must figure on using more Alcoa Aluminum."

THIRD MILESTONE showed up almost before you got that note made. November 18, 1940 saw another reduction on Alcoa Aluminum ingot to 17c a pound, making a total reduction of 15% in the midst of a general seller's market. Defense got most of the immediate benefit, but the future of aluminum for you, and you, and you, was writ larger than ever.

17¢

THEN CAME 15c INGOT, effective Oct. 1, 1941, with accordant reductions in fabricated forms of Alcoa Aluminum. This means that the arithmetic of weight saving is all new, since last you figured on using this versatile metal in a civilian application. When the emergency is over, the fact is that all your old material cost comparisons will be as dead as a dodo.

15¢

THE ARITHMETIC IS NEW; but the fundamentals just get more so! More than ever, the strong alloys of Alcoa Aluminum are *the* answer to lightness with strength.

ALUMINUM COMPANY OF AMERICA

ELECTRA'S HUSBAND

Taxes and Prices

"WELL we may not be able to beat the tax collector on March 15," Electra said with a gleam in her eye, "but I saved a lot of money today." It was September 30 and from the packages strewn from bedroom to kitchen, it was evident that she had been shopping. "I bought ten decks of cards, a new kitchen clock, an assortment of Scotch for you, and some other things. Tomorrow the new taxes go on and prices will shoot up."

"That's what you and a lot of dealers think," I countered. "As a matter of fact prices won't go up except on a very few items. Moreover, the dealers have little or nothing to do about it. All of you are about as confused as the distributor's salesman I met today. He had a letter worked up for his customers that you ought to read." And I passed her the following to peruse.

"Although the general tax situation is in a bad state of flux, the points enumerated below are substantially correct. If followed with a clear conscience and a strong stomach they will keep you out of jail.

"New taxes are effective October 1, or thereabouts, commencing at midnight September 30, should any store remain open at that unholy hour to sell our goods, which are hard enough to sell in the daytime. Whereas taxes will be levied on appliances of a certain color, weight and texture or composition and whereas such other taxes will not be levied to cover said other appliances, or not said; and whereas other forgotten taxes will be applied in accordance with Internal Revenue Order No. 46352437, as hereinunder specified, together with all other excise taxes, combining the hidden tax and the supertax, wherewithall not including such excise tax as may have been levied prior to this date, which is not certain.

"Now therefore, other taxes above and not including such excise tax, which in the case of refrigerators is 4½ per cent and in the case of a harmonica, 10 per cent, with no discount, the aforementioned supertaxes will become null and void; but depending upon the poll taxes—if such is not levied on pole cats, but which does not include cedar poles! The manufacturer's tax is much more simple to understand if you will keep in mind the increased retail price of such taxable items, and only be concerned with it as a point of historical interest as appeasing the dealer. This tax will not shift to anyone except by default, in which case the customer can be billed such amount of extra tax as can be collected through the regular routine of the credit department, even to the extent of calling the sheriff and establishing a 'corpus delicti.' If the tax is an excise, not yet invoked but about to be, under our general laws of taxation and levies, it is possible to invoke a habeas corpus through the state capital, even with a change of venue, where such taxes are alleged to have originated by intravenous action in the lower courts. By combining the excise taxes and the taxes that are about to become law, adding same to our invoice, where such levy will not encumber backorders, or clutter up priorities, some profit can be made on such hidden taxes if you can hide them well, before the discount is taken off. This point should be clearly understood by all concerned, especially the service department where such random taxes can be collected in theory if not in fact."

"The fellow who wrote that must have been goofy," Electra commented when she finished reading.

"No more so than the dealer who tried to figure out how the taxes affected him," I said.

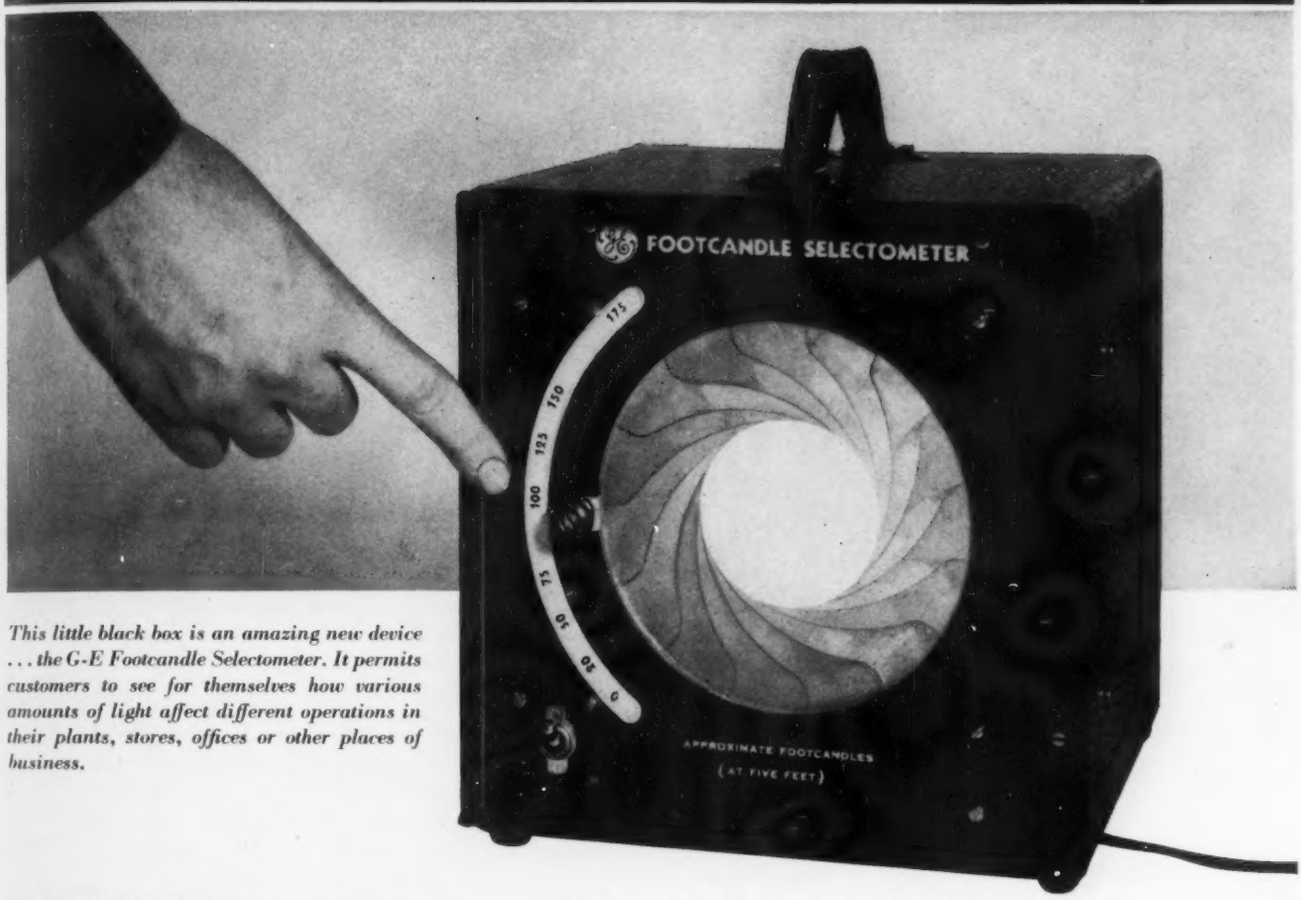
TALK of taxes led to talk about prices. I opined as how conditions brought on by the defense program should eliminate a lot of unethical practices, including price-cutting. Electra did not think so and cited some instances. Since that conversation, a friend just back from the East handed me a sheet containing what purports to be a "chain letter being circulated to appliance dealers throughout New England." It might correct a lot of abuses if the same letter received a lot of circulation among dealers on the Pacific Coast, where this situation is at least as prevalent and certainly doesn't enhance our old Western reputation for honesty and fair play. Here it is:

"Is there one of us dealers who has not yet learned that the knife we use to cut each other's throats has a double-edged blade—that when we cut another's Adam's apple we also slice our own. . . . I, for one, cry big salty tears thinking of the profits I've lost by not always getting full retail prices and of the business I've lost because some other dealer did the same thing. . . . And why have we cut prices? Not because a customer forced us to by any 'buyers' strike.' A few years ago they gladly paid several times today's list prices for equipment not nearly as good. We've cut prices just because we ourselves are forcing ourselves to do so. Silly, isn't it? In the land of liberty and free enterprise we, who are in business to make money, have tried to make more by taking less and have succeeded generally in making less!!! . . . . The practice of price cutting was bad enough when merchandise was plentiful, but man alive, what's the sense of give-away prices now on a product that is enjoying its greatest sales volume in history. . . . Just the other day a news item said, 'Many economists believe record sales of big items generally bought on the installment plan, such as refrigerators, autos and stoves, will adversley affect defense savings bond sales for some time. However this situation will rectify itself in the normal course of events by a decline in the supply of raw materials.' Purchases of appliances may even be discouraged by tax and by outlawing easy terms so that purchasing power will be welled up to pick up slack after the war boom is over. . . . (This has been done and how!—The Ed.)

"With this staring us in the face let's be business men—salesmen, not just order takers—and get our regular price while we have something to deliver. . . . We deserve it and need it. . . . This letter will have served its purpose if it just makes you think about how foolish many of us have been in cutting prices, even just a little, and if it makes you, as it did me, decide to stop this silly practice now. Let's give the customer a tussle and get our regular price. . . . Perhaps a prospect will come in on your floor in the next five minutes. He might be the one who walked in on me two hours ago. If you, too, hold your price, and if we all do the same, we'll get our share of the business at a profit!"

"Send copies to five competitive dealers—DON'T BREAK THE CHAIN," is the way the letter ends. Good advice, what?

How to show a customer a sample of 100 footcandles!



This little black box is an amazing new device . . . the G-E Footcandle Selectometer. It permits customers to see for themselves how various amounts of light affect different operations in their plants, stores, offices or other places of business.

IF YOU'VE EVER TRIED TO SELL a customer a 100-footcandle lighting installation, you know what a lot of resistance you've had to overcome before you got to first base.

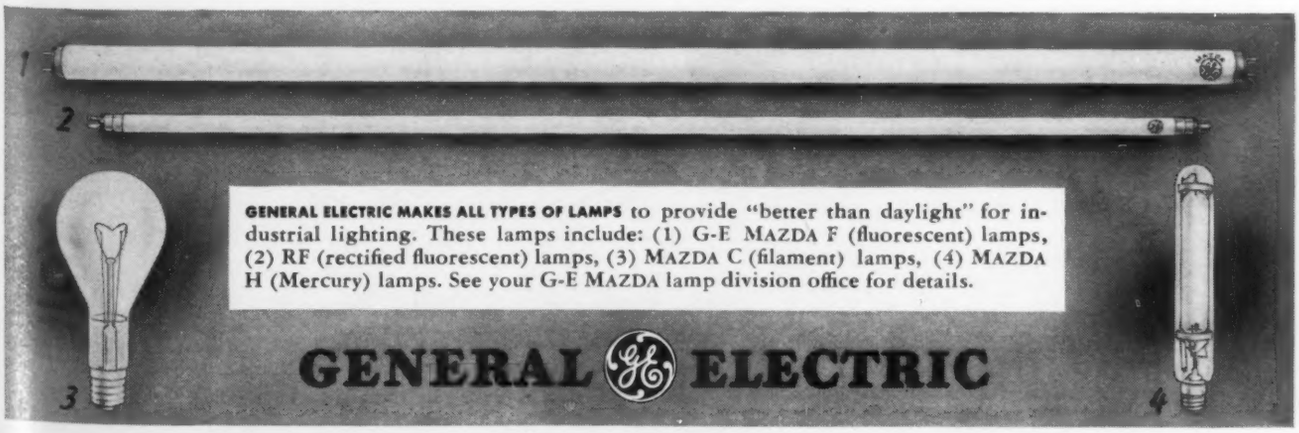
Why? Largely because 100-footcandles is something that's difficult for most people to visualize. If they could see 100 footcandles . . . actually experience how much easier, faster, and more efficiently they could work under 100 footcandles, higher level lighting would be easier to sell.

AND NOW THE G-E FOOTCANDLE SELECTOMETER provides the answer to the lighting salesman's prayer. It offers a means to show customers what 100 footcandles look like. Yet the Selectometer is just as portable and even lighter than most sample cases.

The G-E Footcandle Selectometer makes it possible for your customer to select the amount of light he would like for easier seeing. It works on a simple principle whereby the amount of light directed on a job can be increased or decreased . . . anywhere from 0 to 175 footcandles. After a little experimenting, the customer can tell when the light seems best to him.

FROM THEN ON, the experience of scores of lighting salesmen shows that the job of selling the higher level lighting installations is much simpler. Every lighting salesman in your territory should carry one. How many can you use?

For complete information, see your local General Electric Lamp Division Office.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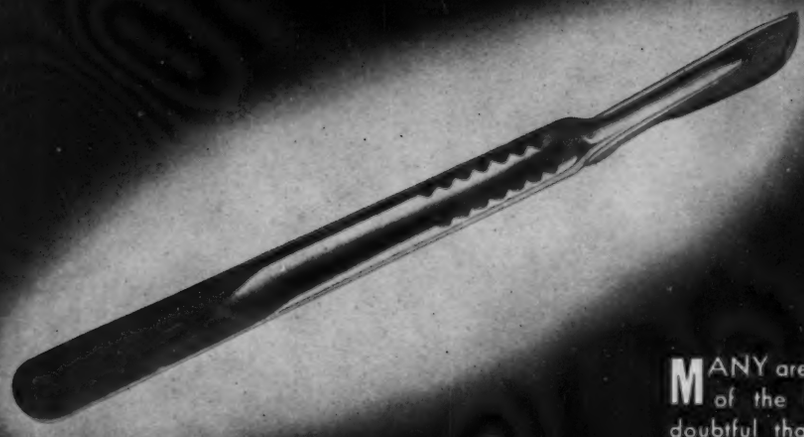
GENERAL ELECTRIC MAKES ALL TYPES OF LAMPS to provide "better than daylight" for industrial lighting. These lamps include: (1) G-E MAZDA F (fluorescent) lamps, (2) RF (rectified fluorescent) lamps, (3) MAZDA C (filament) lamps, (4) MAZDA H (Mercury) lamps. See your G-E MAZDA lamp division office for details.
GENERAL ELECTRIC

DAMASCUS...

Modern Version



The cutting edge of a surgeon's scalpel through a microscope

MANY are the stories told of the qualities of the Damascus sword. Yet, it is doubtful that the cutting quality of this famous steel could compete with that of the modern surgeon's scalpel.

Metallurgists today feel that the famous steel was the result of layers of carburized iron, forged and reforged until the harder grains were evenly distributed. Modern forgings follow the same principle. The constant pounding of the hammers refine the grain structure and result in strength and uniformity.

THE BREWER-TITCHENER CORPORATION
Cortland, New York

Little Lessons in Forging

HEAT TREATING

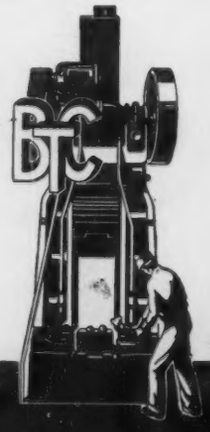
Heat treating is a means of obtaining greater strength in a forging with no increase in weight. The subject is highly technical and no attempt is made here, other than to outline its possibilities.

It is interesting to note however that, for example, a forging with approximate strength of thirty-thousand pounds can be increased to about forty-five thousand pounds by this method. The entire process is based on the grain structure of the forging and further refines this grain to increase its strength. For strength with no increase in weight, specify heat-treated BTC Hi-Line Hardware.

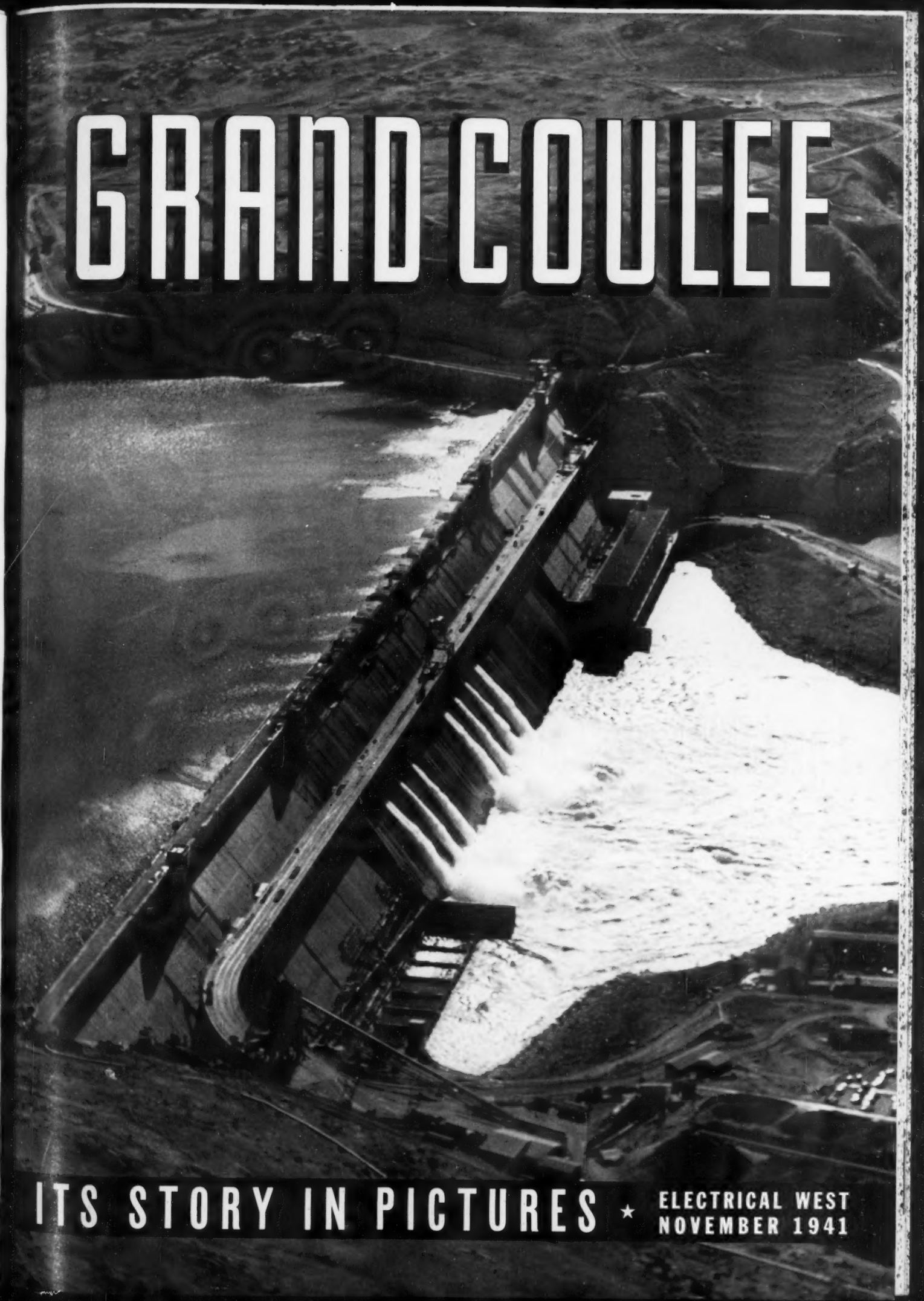
A fully illustrated booklet outlining the history of forging will be sent free on request as long as the supply lasts.

FORGERS OF HI-LINE HARDWARE

THROUGH YOUR INSULATOR MANUFACTURER ONLY



YOU KNOW WITH A FORGING


GRAND COULEE
ITS STORY IN PICTURES ★ ELECTRICAL WEST
NOVEMBER 1941

LARGEST STRUCTURE EVER BUILT BY MAN

OF ALL the concrete dams constructed by the U. S. Bureau of Reclamation, Grand Coulee is overwhelmingly the greatest in volume and potentialities (Coulee, 10,500,000 cu. yd.; Shasta, 6,000,000 cu. yd.; Boulder, 3,250,000 cu. yd. and Friant, 2,200,000 cu. yd.)

Though it is the third to be built, the Grand Coulee Dam is the first in importance among the ten dams proposed for developing the Columbia River within the United States. It is not only the largest, but the uppermost of the ten dams, and it will have the greatest water storage capacity. By releasing stored water in the winter season of low flow, the firm power capacities of the Grand Coulee and other hydro-electric plants on the Columbia, above its junction with the Snake River, will be doubled, and the firm power capacities of plants below that point will be increased fifty per cent. By this same means, two feet or more will be added to the navigable depth of the lower Columbia.

The dam will also be the means of reclaiming a million and a quarter acres of land in the Big Bend district in central Washington, thus promoting the general development of the Pacific Northwest, and the country as a whole. From a power standpoint it develops 27 percent of the 1,290-ft. drop made by the Columbia from the Canadian border to tidewater.

The construction of a dam across the Columbia, near the head of the Grand Coulee, was conceived originally only as a means of raising water from the Columbia River to the semi-arid land of the Big Bend country, with little or no thought of power development. Other irrigation schemes were proposed for watering parts of the area, but investigations of these proposals proved that land alone could not bear the construction costs, and that power and other beneficiaries must share the burden. In its comprehensive report on the development of the Columbia, the United States Engineers Corps approved the Grand Coulee power and irrigation development.

Essential features of the Columbia Basin Reclamation Project are the Grand Coulee Dam, a 151-mile storage reservoir extending from the dam to the Canadian border, a powerhouse on each side of the central spillway at the dam, a pumping plant to lift irrigation water from the storage reservoir to the irrigating system, a 27-mile balancing reservoir to be formed by earth dams in the upper Grand Coulee, and a system of canals and other irrigation works which will, within the next 25 to 50 years, cover an area sixty miles wide and eighty-five miles long, extending from Soap Lake to Pasco in Washington.

It is probable that little progress, other than engineering work, will be made on the irrigation project until

the pressure of the defense program on national resources is relieved.

As a recovery project, work was begun by the Bureau of Reclamation, in 1933, on a low-dam power development at Grand Coulee, with the idea of enlarging the dam some time in the future, and adding the irrigation phase of the plan. Actual construction commenced July 13, 1934. Before the work of excavation was very far advanced, the Bonneville power and navigation project was undertaken by the Army Engineers, and the construction contract was altered to cover the base of the Grand Coulee high dam. That was completed early in 1938 by the Mason-Walsh-Atkinson-Kier Co., known as MWAK.

In 1938, the completion of the dam, the west powerhouse building, and the base for the pumping plant was undertaken by Consolidated Builders, Inc., (CBI), composed of the MWAK company, the Six Companies, builders of the Boulder Dam, and the General Construction Co., builders of the Owyhee Dam.

The CBI contract is practically completed, two 10,000-kw. generating units have been in operation since March 1941, one 108,000-kw. generator has replaced the two small units on the transmission system of the Bonneville Power Administration, a second 108,000-kw. unit will go into service in midwinter, and a third will be furnishing power in March 1942. Three additional units are on order, and will be in operation in 1943. The power output will be sold by the Bonneville Power Administration, and distributed over its transmission system, which includes lines from Grand Coulee to Spokane, Puget Sound, and the lower Columbia.

Numerous new records have been and will be established on this project. In volume, the dam is by far the largest masonry structure ever built. It contains ten and a half million cubic yards of concrete. It will create the biggest waterfall on the continent—more than twice the height of Niagara. The completed power plant will greatly exceed any other in capacity when its eighteen 108,000-kw. generators and three 10,000-kw. house units are all in place. It will carry the greatest single concentrated load—twelve 65,000-hp. motors—when the pumping plant is completed. It will develop the largest single irrigation project ever undertaken—1,200,000 acres of land, and homes for 300,000 to 400,000 people on farms and in towns. And it will be the key station on the biggest hydro-electric development in the world, if and when the Columbia and its tributaries are fully developed.

Many construction records were made. The world's largest cofferdam, 3,000 ft. long, inclosing a 60-acre area, and containing 151 miles of steel sheet piling, was constructed in 90 days. Thirteen million yards of overburden were moved nearly a mile to spoil banks on 60-in. conveyor belts at rates in excess of 50,000 yd. a day. Gravel was moved out of the pit with 7-cu. yd. dippers and 60-in. conveyor belts at the rate of 75,000 tons a day. Washed sand and gravel were produced and delivered at the rate of 650 to 700 carloads a day. Cement was used at the rate of 70 carloads a day. And concrete was made and placed at the average rate of 17,299 yd. a day for a whole month. A hundred million board feet of timbers and lumber were used. Sixty million man-hours of employment were provided at the dam, and perhaps as much elsewhere throughout the country, in mines, and mills, and factories, and on railroads, and highways, and farms. And a huge source of power has been harnessed.

Enumeration of Grand Coulee construction "wonders" could proceed by the column. Rather let the accompanying pictures set forth the story of this achievement in building what is the largest structure ever erected by man.

The dam and power plant were designed by the Bureau of Reclamation, and constructed under its supervision. Responsible for the project are Harold L. Ickes, Secretary of the Interior; and John C. Page, Commissioner; S. O. Harper, Chief Engineer; J. L. Savage, Chief Designing Engineer; L. N. McClellan, Chief Electrical Engineer; Frank A. Banks, Supervising Engineer; J. H. Miner, Assistant Supervising Engineer; and A. F. Darland, Construction Engineer, of the Bureau of Reclamation.

Statistics

DAM

Length	Base, 3,000 ft., crest 4,200 ft.
Width	Base, 500 ft., crest 30 ft.
Height above bedrock	550 ft.
Spillway	Width 1,650 ft., capacity 1,000,000 sec.-ft.
Spillway gates	11-28 ft. high, 135 ft. long
Outlet tunnels	60-8½ ft. in diameter
Concrete content	10,500,000 cu. yd.
Cement content	12,000,000 bbl.
Reinforcing steel	77,000,000 lb.

POWER HOUSE

Capacity	1,974,000 kw.
Turbines	18 each rated 150,000 hp.
	3 each rated 14,000 hp.
Generators	18 each rated 108,000 kw.
	3 each rated 10,000 kw.

STORAGE RESERVOIR

Area	82,000 acres
Length	151 miles
Capacity	
Total, 10,000,000 acre-ft., useful, 5,000,000 acre-ft.	
Pumps	12 (2 spares) capacity each 1,600 cu. ft. per sec.
Pump motor rating	Each 65,000 hp.
Average pumping head	280 ft.

DRAINAGE BASIN

Area	74,100 sq. mi.
Mean annual run-off	79,000,000 acre-ft.
Maximum required for irrigation	6,000,000 acre-ft.
Mean annual flow	109,000 sec.-ft.
Maximum recorded flow	492,000 sec.-ft.

During construction concrete was delivered to the dam over steel trestles. Originally, two trestles were built on bedrock to enable special gantry cranes to cover a 500-ft. strip across the canyon. After the base of the dam was completed one 4-track trestle was erected and used until the completion of the dam. It was buried in the concrete as pouring proceeded. During early stages of construction seven hammerheads and three revolving cranes operated from high trestle as shown below

CONSTRUCTING THE DAM

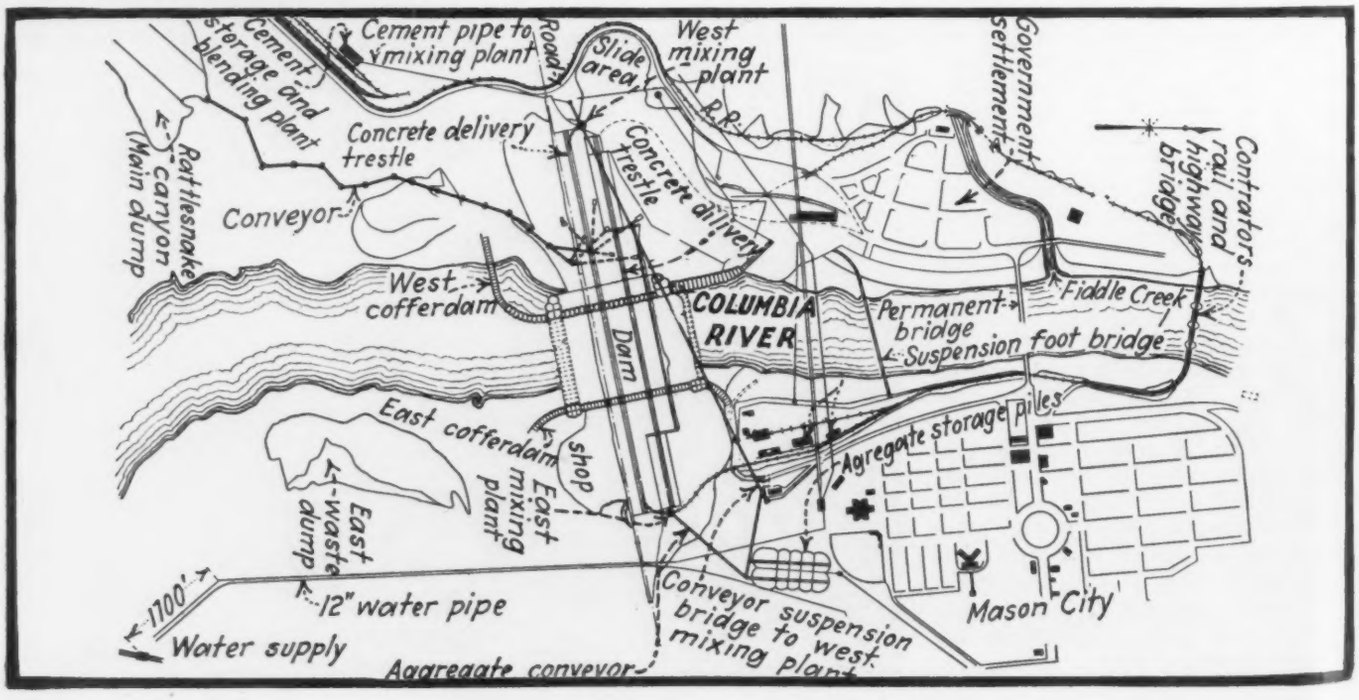
GRAND COULEE DAM is a gravity type structure with a 1,650-ft. central spillway section flanked by powerhouse and abutment sections 1,200 to 1,500 ft. long (see plan below). At the base of the spillway below the river channel is a "bucket" or artificial plunge-pool, 90 ft. wide and 30 ft. deep, to prevent erosion. Construction camp, the government town and a bridge across the river were all located below the dam. Aggregates came from below also. The cement mixing plant was above.

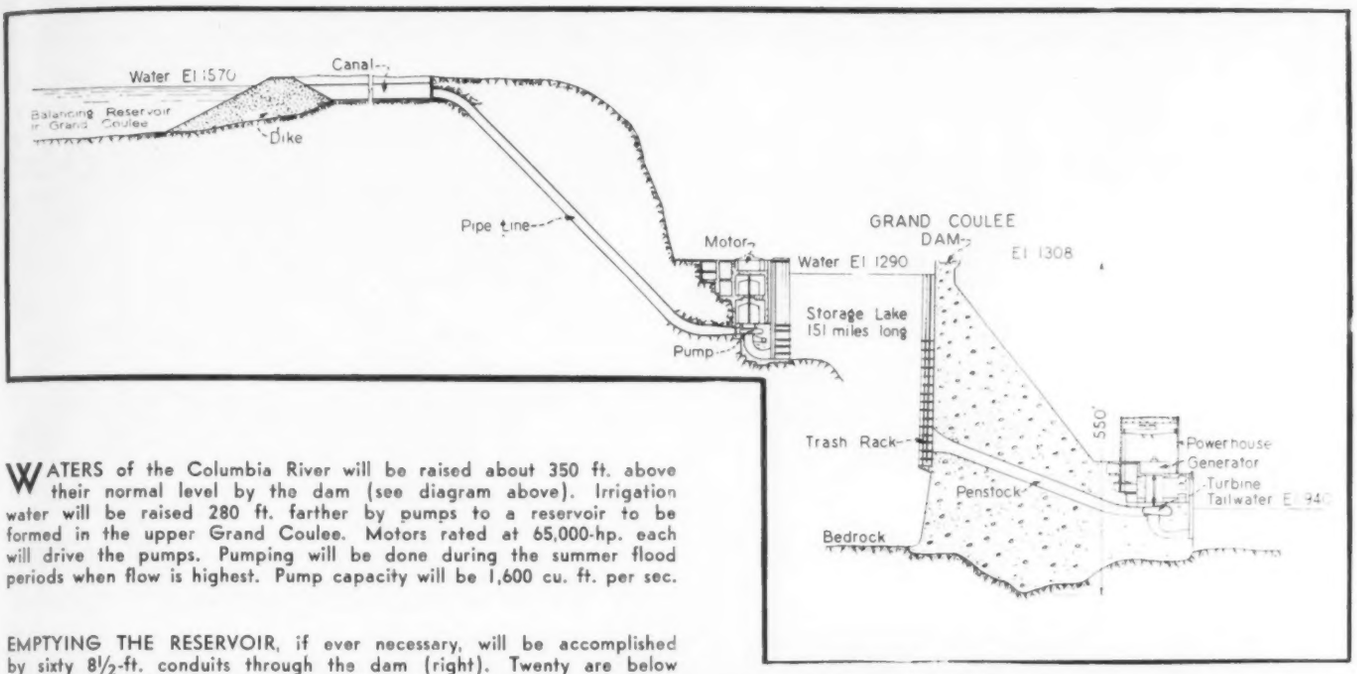
SAND AND GRAVEL to the extent of 12,000,000 yd. were used in building the dam. They were obtained from a deposit downstream and high above the river on the right bank (pictured above, right). Oversize material was crushed to 6 in., and the entire output of the gravel pit went through a screening and washing plant, where four sizes of gravel and three sizes of sand were recovered for final blending.

A CONVEYOR SYSTEM requiring 5,000 hp. of electric motors to drive it handled excavated material. It was made up of sections of 60-in. belt conveyor in varying lengths, each driven by a 200-hp. motor. It carried material excavated from the west side of the river to a spoil bank in Rattlesnake Canyon ¾ of a mile distant and 700 ft. above the damsite. During low water periods overburden from the east side was carried across the river on a pile trestle and delivered to the main conveyors.

FREEZING OF A CLAY BANK to form an arched, frozen earth dam about 45 ft. high, 25 ft. thick and with a span of about 110 ft. was one of the most spectacular excavation operations (shown at left center). No other feasible means had been found of preventing a large clay deposit from flowing into a deep crevice in the bedrock. The frozen dam remained in place from August, 1936, to April, 1937.

CONCRETE was mixed in 4-yd. batches at a central plant and delivered on the job in 4-yd. buckets (pictured at left) hauled four on a flat-car by diesel-electric locomotives. Delivery of the bucket was supervised by a signal man with portable telephone equipment connecting him directly with the crane operator. Blocks were generally 50 ft. square, and lifts were uniformly 5 ft. thick, poured at 72-hr. time intervals.





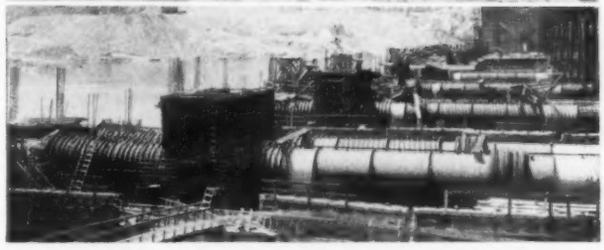
WATERS of the Columbia River will be raised about 350 ft. above their normal level by the dam (see diagram above). Irrigation water will be raised 280 ft. farther by pumps to a reservoir to be formed in the upper Grand Coulee. Motors rated at 65,000-hp. each will drive the pumps. Pumping will be done during the summer flood periods when flow is highest. Pump capacity will be 1,600 cu. ft. per sec.

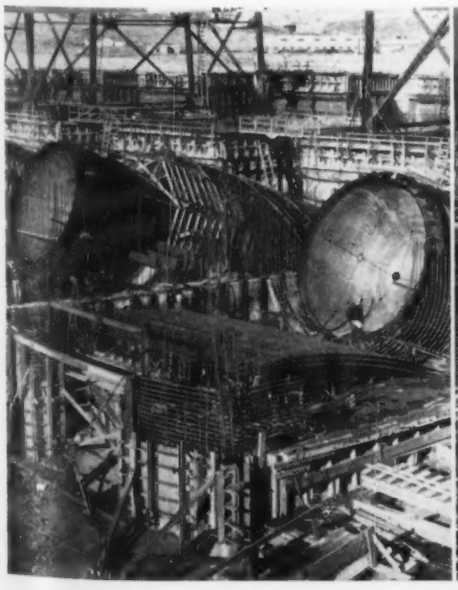
EMPTYING THE RESERVOIR, if ever necessary, will be accomplished by sixty 8½-ft. conduits through the dam (right). Twenty are below the low water level and the remainder distributed in two sets of 20 at intervals of 100 and 200 ft. above. During the last two years most of the flow of the river was carried through these conduits. Beginning next spring they will be closed and the entire flow, less what may pass through the power house, will go over the 1,650-ft. spillway.

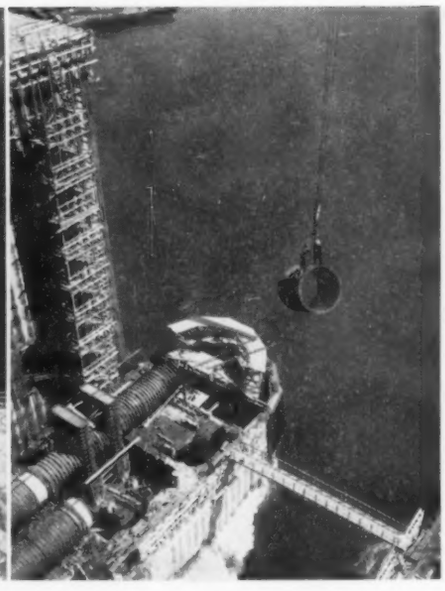
UPPER SECTIONS of the 18-ft. steel penstocks were buried in heavy reinforced concrete during the construction period (below left). Each penstock was provided with a hemispherical bulkhead welded in place to be removed by cutting at a later date. Entrances into the penstocks, 15 ft. wide by 30 ft. high, were formed in the concrete in the upstream face of the completed dam. Hydraulic gates control the water flow.

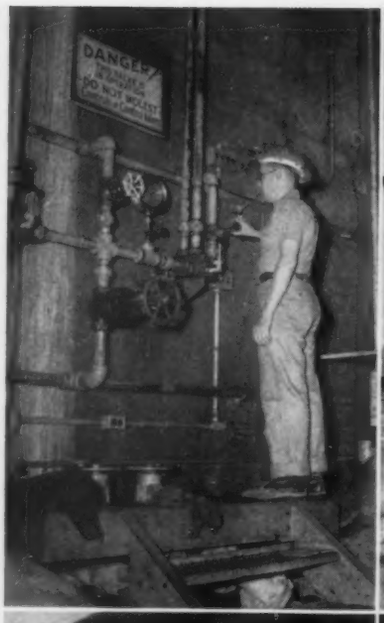
FLOW OF THE RIVER was diverted through 50-ft. low gaps left in the concrete. From time to time during concreting, the upstream openings of such gaps were closed by 70-ton steel gates handled by floating equipment which moved them into place (below center).

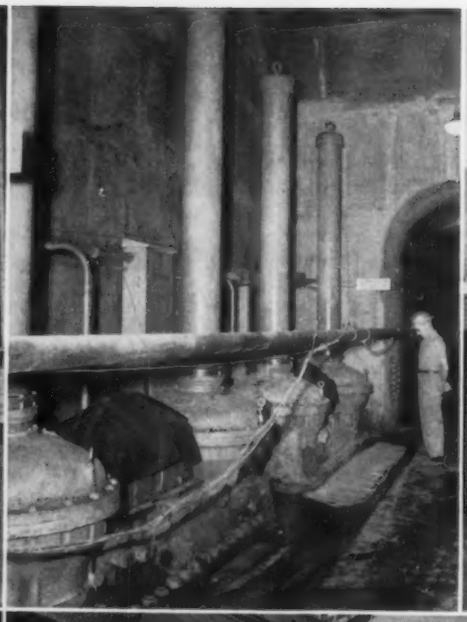
THE UPPER FORTY of the sixty 8½-ft. outlet conduits are metal lined, the upper ends with semi-steel ribbed castings, the uppermost flared to a large diameter to prevent vacuum formation at the conduit entrance (below right). Two large gate valves in each, permit control.

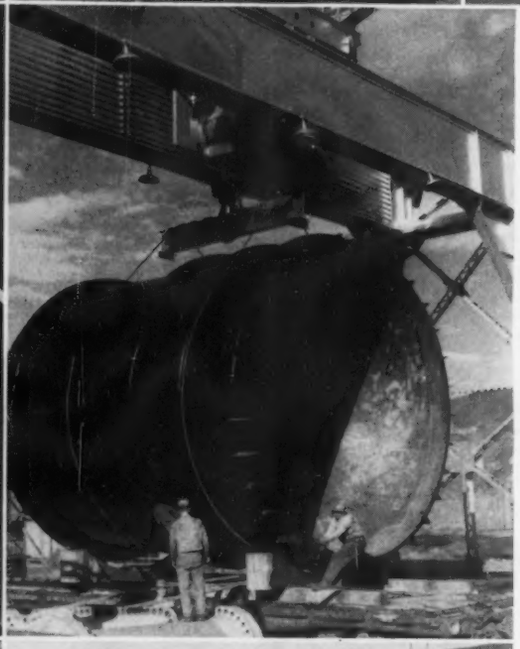












HYDRAULICS

UPSTREAM GATE VALVES in the 20 lower outlet conduits are hydraulically-operated slide valves with bodies buried in reinforced concrete (top left). Downstream valves in lower 20 outlet conduits and all valves in the upper 40 are motor-operated (above center). They are so designed that the seats on the leaves and the seats in the bodies of the valves are separated before the valve leaf is moved.

PORTALS TO THE PENSTOCKS are 15 ft. wide and 30 ft. high and are closed by means of structural steel gates (above right) with retractable monel metal seats, which move horizontally into place against corresponding seats imbedded in the face of the dam. A 150-ton crane was provided for gate installation; normally the gates operate hydraulically by a series of valves.

PENSTOCKS are 18 ft. in diameter, the steel varying in thickness from 3/4 at the upper end to 1 1/2 in. at the outlets (left). Plates shaped and planed in Chicago were electrically welded at the dam into 20-ft. sections. Shop joints on 1-1/16-in. and thinner plates were welded in a single pass on automatic machines. Heavier plates and construction joints were hand welded. A hemispherical bulkhead was welded into the uppermost section to be burned out after installing the corresponding turbine.

ELEVEN DRUM GATES 25 ft. high and 135 ft. long, weighing 500 tons each, are installed on top of the spillway section under concrete arch highway bridges (bottom left). They were assembled in place. Roughly triangular in cross section, they are hinged along their upstream edges; when fully open they rest in pits in the dam's crest. Flexible seals make the joints.

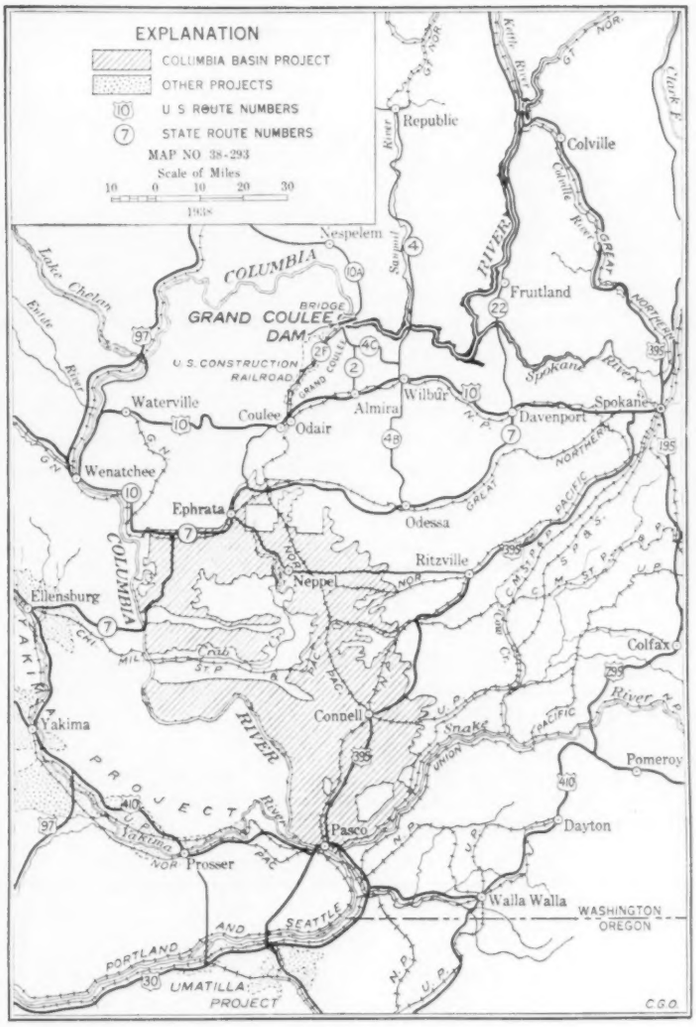
IRRIGATION

IRRIGATION WATER ultimately will be put upon some 1,200,000 acres of land out of a total of 2,500,000 acres in the area to the southward from Grand Coulee Dam (see map right). In 1937 crews started what is said to have been the largest single land surveying project. At times upwards of 150 men were in the field. Procedure was in six steps: (1) Retracement, following the notes of the Land Office of original surveys for the purpose of finding or relocating section and quarter-section corners. (2) Monumenting all such points with concrete and steel pipe markers. (3) Determination of the elevation of all monuments with reference to USGS bench marks. (4) Topography taken by plane table crews at 2-ft. intervals on all land likely to be irrigable. (5) Classification by soil technologists using topographical maps and digging test pits—at least one to every 40-acre tract—of all land into non-irrigable or one of three classes of irrigable land. (6) Appraisal to fix the present values of land and improvements, if any. This fixes the price at which water will be supplied and the price at which the land must be sold after the government and land owners conclude a repayment contract.

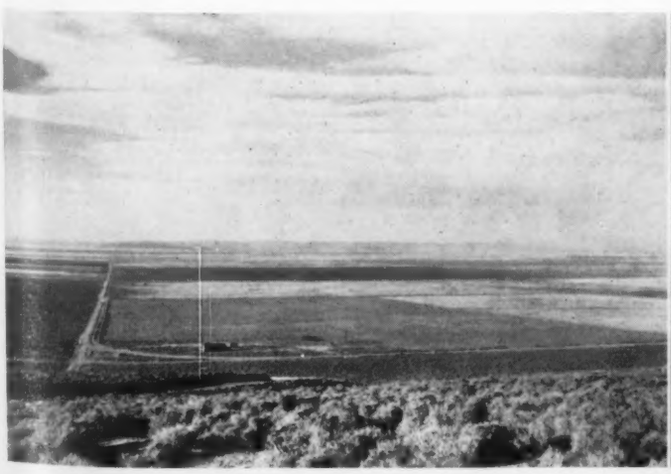
THE ANTI-SPECULATION LAW, designed to insure many farm homes rather than a few large ranches on the project, and to protect settlers from speculative land prices, provides that no water will be available for land not sold in compliance with the act's terms.

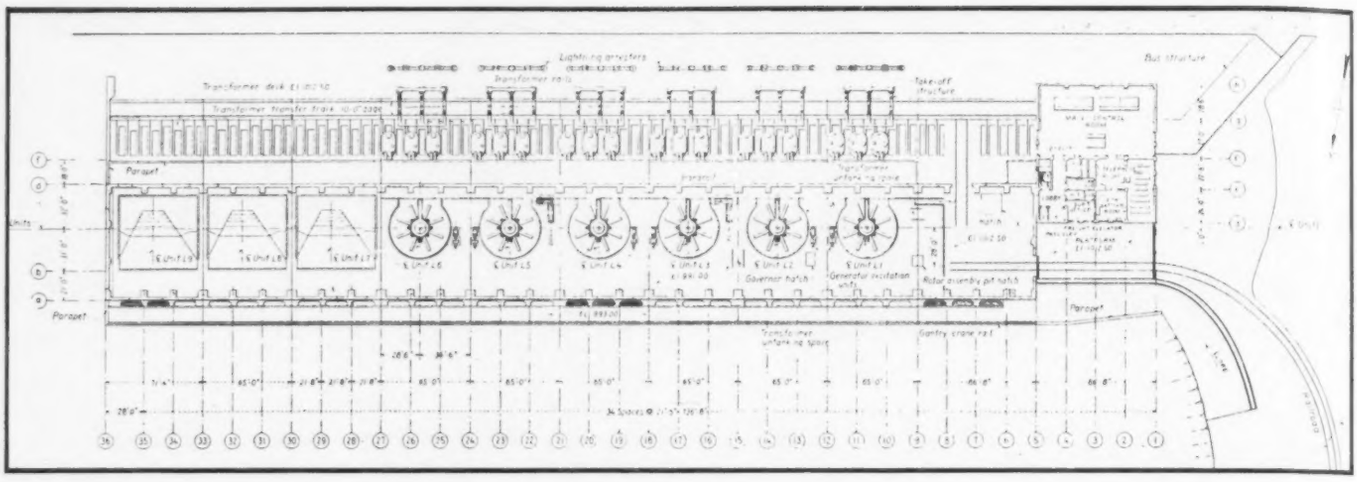
OTHER THAN ENGINEERING WORK, it is probable that little progress will be made on the irrigation project until the pressure of the defense program national resources is removed in the future.

WATER FROM THE BALANCING RESERVOIR will be diverted into a main canal that will lead to a point near Coulee City (see map). There it will divide into a main east and a main west canal that will carry it to the laterals that will put it on the land.



SURVEYORS used ingenuity in mapping topography for selecting the irrigable land and designing the water distributing system (top left). More than a million and a quarter acres were carefully surveyed and mapped. Large areas which are to receive irrigation water were once used as dry farms and some areas still are so used (below left). About 90% of the land is privately owned, but must be sold to settlers at its dry-land value in order to be eligible to receive irrigation water. Typical of the area to be irrigated is that pictured below (right). A variety of topography and soils are found in the region covered by the project. Soils have been examined and classified, and all land with shallow or inferior soil, or with topography too rough, has been excluded and will not receive water.

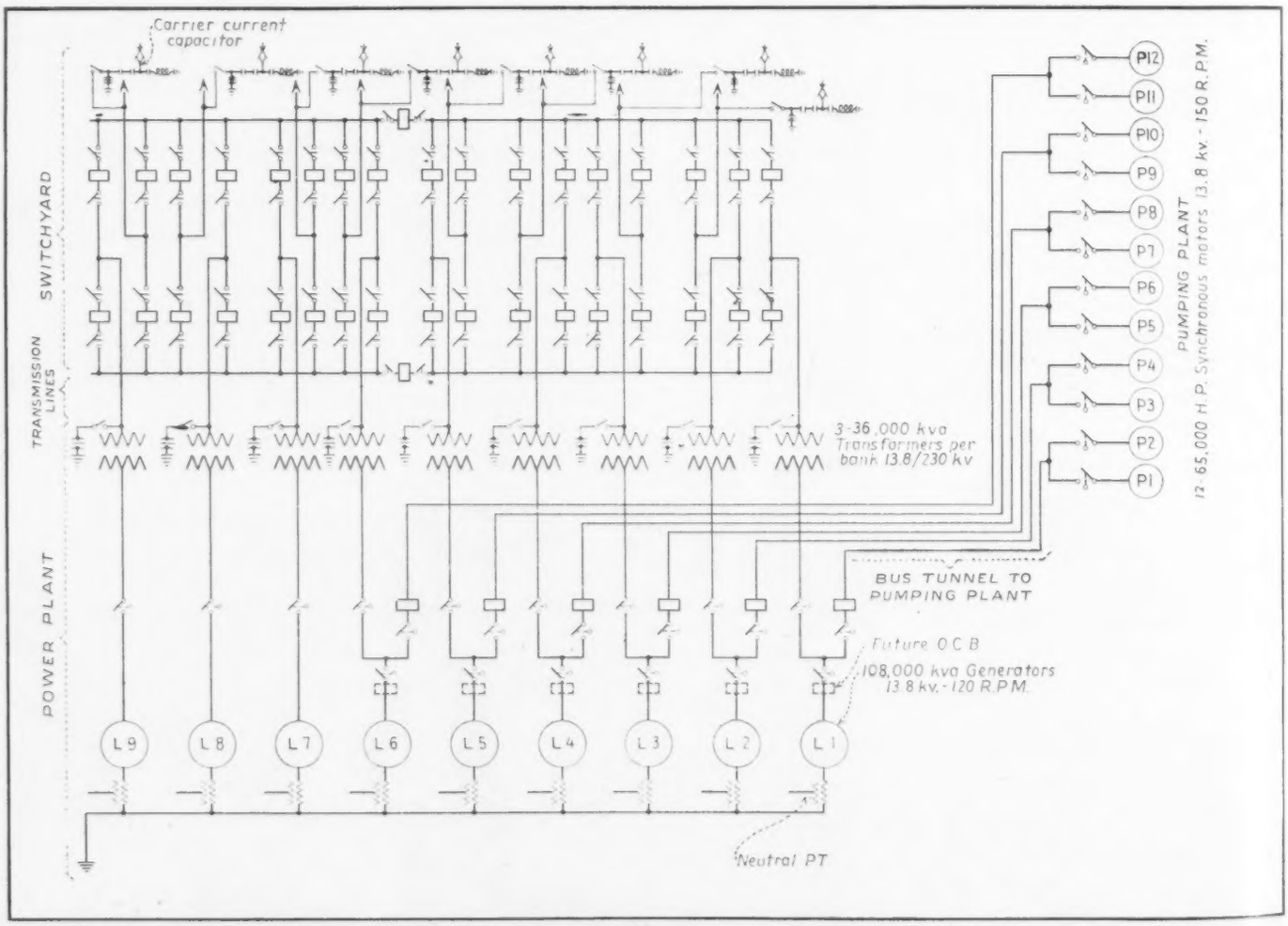


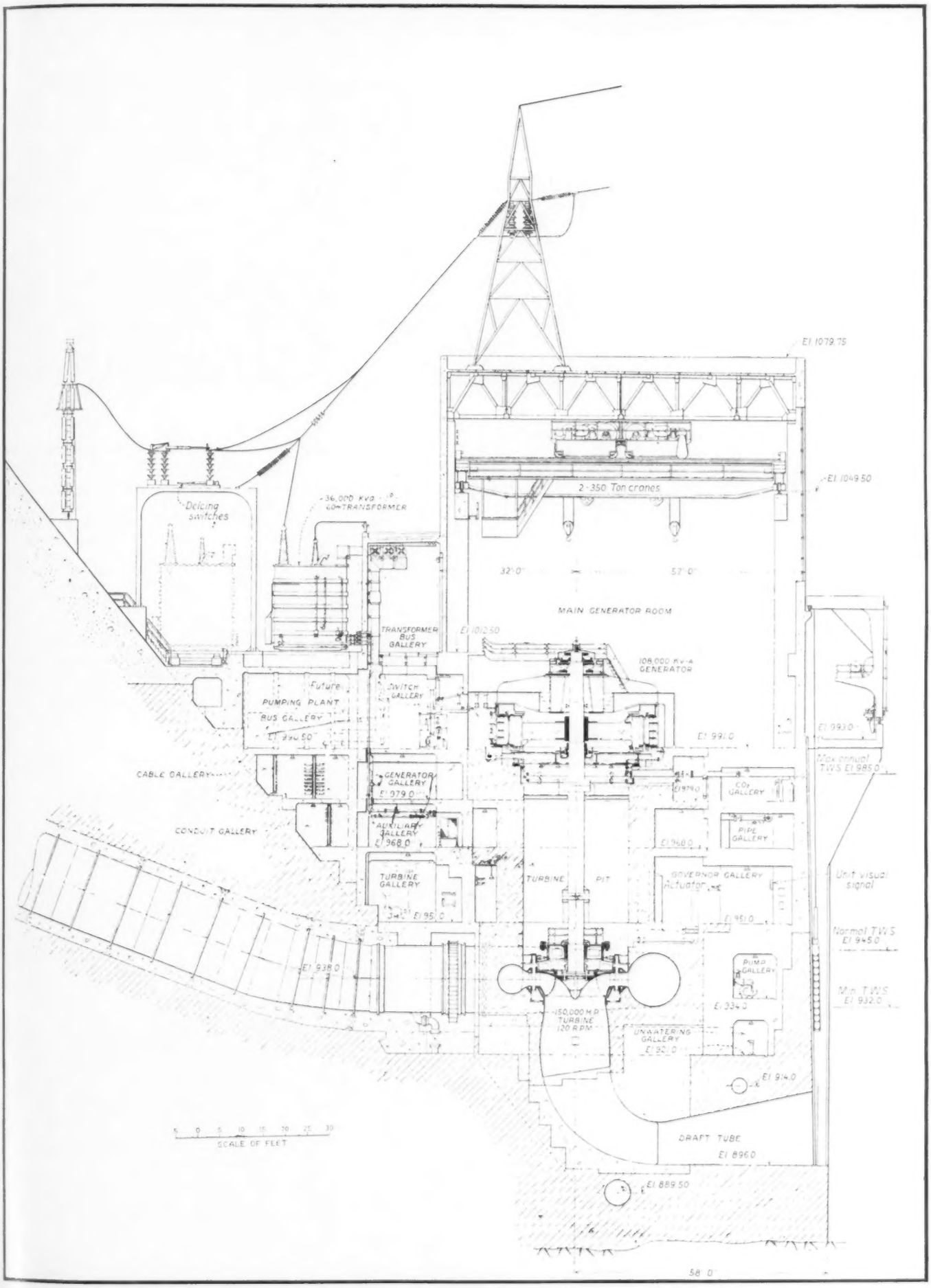


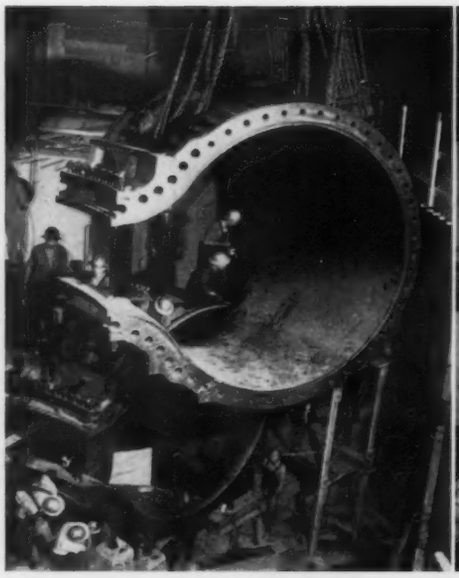
POWER PLANT

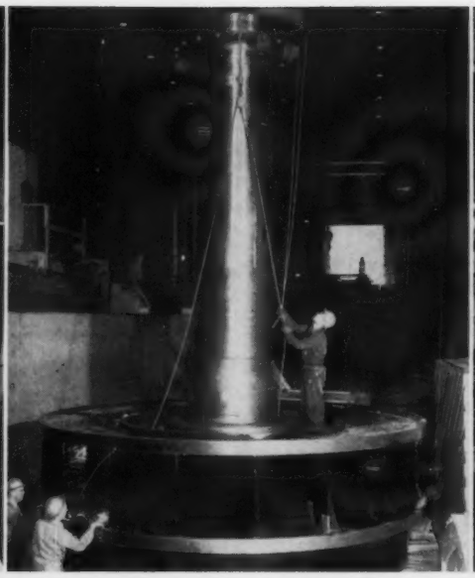
POWER HOUSES are located at both the east and west ends of the dam. Initially, only the west power house is to be built. It is a heavily reinforced concrete structure which actually consists of eleven buildings, separated by 1-in. cork-filled expansion joints extending from bedrock to the roof. Nine generating unit sections spaced 65 ft. between centerlines and an 85-ft. service bay constitute the main powerhouse. Adjoining is an 85-ft. control bay, making the total structure 85 ft. wide by 785 ft. long. Height from floors of the draft tubes to parapet of the control bay is 200 ft.

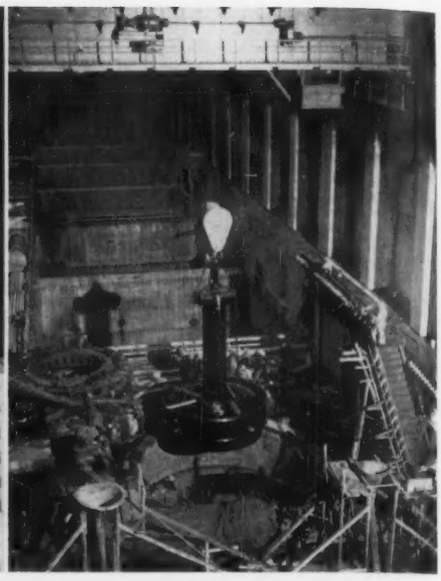
TURBINES are set low so as to reduce the vacuum and attendant difficulties to a minimum during low water. The generator floor is only 6 ft. above the maximum observed flood water stage. Transformer deck and power house entrances are 12 ft. above the estimated flood line of 1894. The downstream power house wall is designed to resist a head of 90 ft. above the lowest open gallery space, the floors and walls of the galleries acting as box girders carrying the horizontal thrust to the walls between the turbine pits.




El. 1079.75
2-350 Ton cranes
El. 1049.50
Deicing switches
36,000 Kva 3-P 60~ TRANSFORMER
32'-0"
52'-0"
MAIN GENERATOR ROOM
TRANSFORMER BUS GALLERY
El. 1012.50
108,000 Kv-A GENERATOR
Future PUMPING PLANT BUS GALLERY
El. 990.50
SWITCH GALLERY
El. 991.0
El. 993.0
Max. manual T.W.S. El. 985.0
CABLE GALLERY
GENERATOR GALLERY El. 979.0
El. 979.0
CO2 GALLERY
CONDUIT GALLERY
AUXILIARY GALLERY El. 968.0
El. 960.0
PIPE GALLERY
TURBINE GALLERY
34'
El. 951.0
TURBINE PIT
GOVERNOR GALLERY
Actuator
El. 951.0
Unit visual signal
Normal T.W.S. El. 945.0
El. 938.0
PUMP GALLERY
Min. T.W.S. El. 932.0
El. 934.0
150,000 H.P. TURBINE 120 R.P.M.
UNWATERING GALLERY
El. 921.0
El. 914.0
DRAFT TUBE
El. 896.0
El. 889.50
5 0 5 10 15 20 25 30
SCALE OF FEET
58'-0"







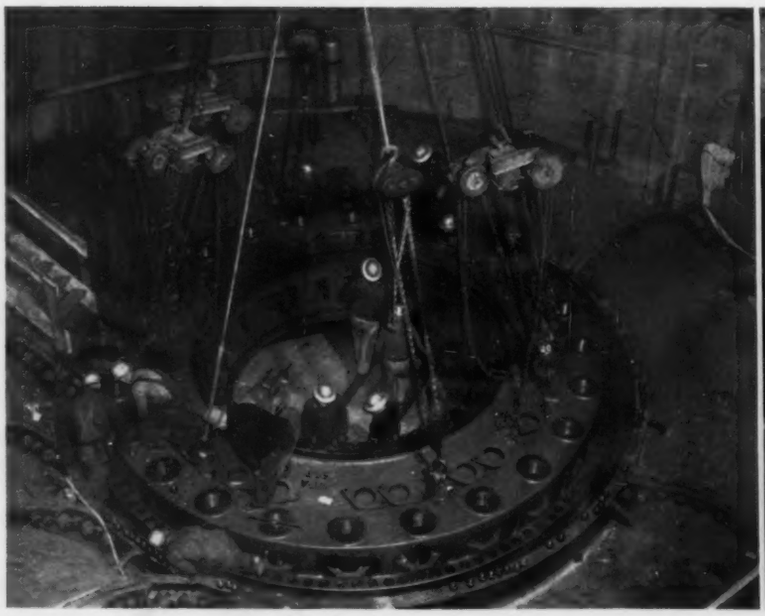
T U R B I N E S

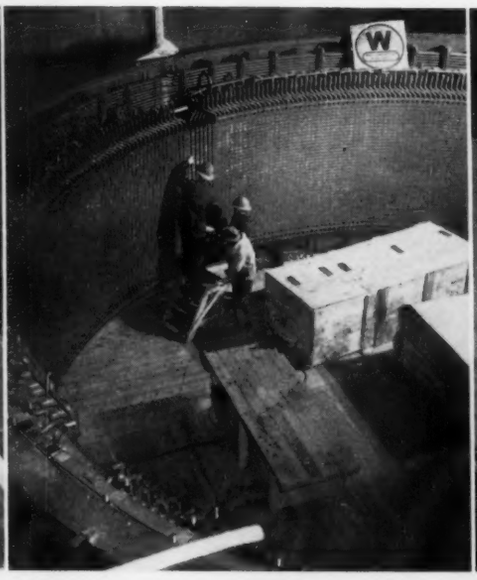
GRAND COULEE TURBINES are of the Francis reaction type, built by Newport News Shipbuilding & Drydock Co. Each is rated at 150,000 hp. at 330 ft., the average head, and 90,000 hp. at the minimum head of 263 ft. Speed is 120 r.p.m. Guaranteed efficiency is 90% at 120,000 to 130,000 hp. The scroll case (above left) consists of 14 heavy steel castings, bolted together to form a 51-ft. diameter spiral with a 15-ft. circular entrance. While under a pressure of 145 lb. per sq. in., and while held securely in place with tie rods, the casing was buried in heavy reinforced concrete. On top of it was erected a 50-ft. concrete pier to support the generator with its Kingsbury bearing.

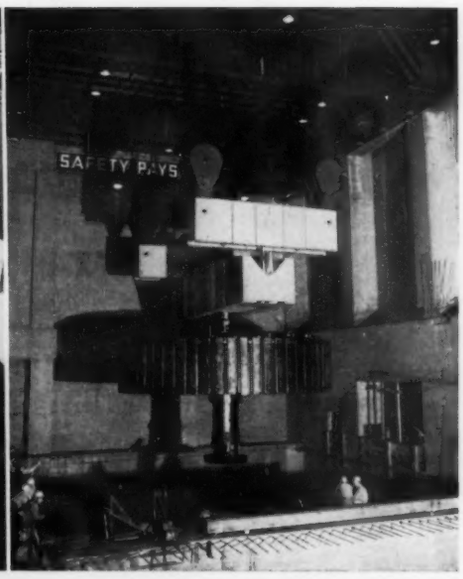
TURBINE RUNNER is a single steel casting, 6 ft. high and 16 ft. 8 in. in diameter, over wear rings (above center). It is attached to an 18-ft. section of 44-in. shaft by 18 bolts. These were chilled to —80 deg. F. in dry ice to shrink them for assembly. Axial holes in the bolts make it possible to shrink them for removal by passing liquid air through the holes, thoroughly chilling them.

TURBINE CROWN PLATE carries the upper bronze bushed bearings for the 9-in. shafts of the 24 wicket gates, the stuffing boxes for the shafts and a central section with a tapered seat for the 45-in. lower main shaft guide bearing (below left). A steel lining for the main shaft well is attached outside the crown plate. In that lining are supported the two servomotors which actuate the wicket gates. A variation of 0.01% in the speed of the turbine actuates the speed-responsive Woodward governor element.

THE 24 WICKET GATES between the speed ring and the turbine runner are linked to a gate shifting ring operated by two double-acting hydraulic cylinders called servomotors and shown in the picture below.

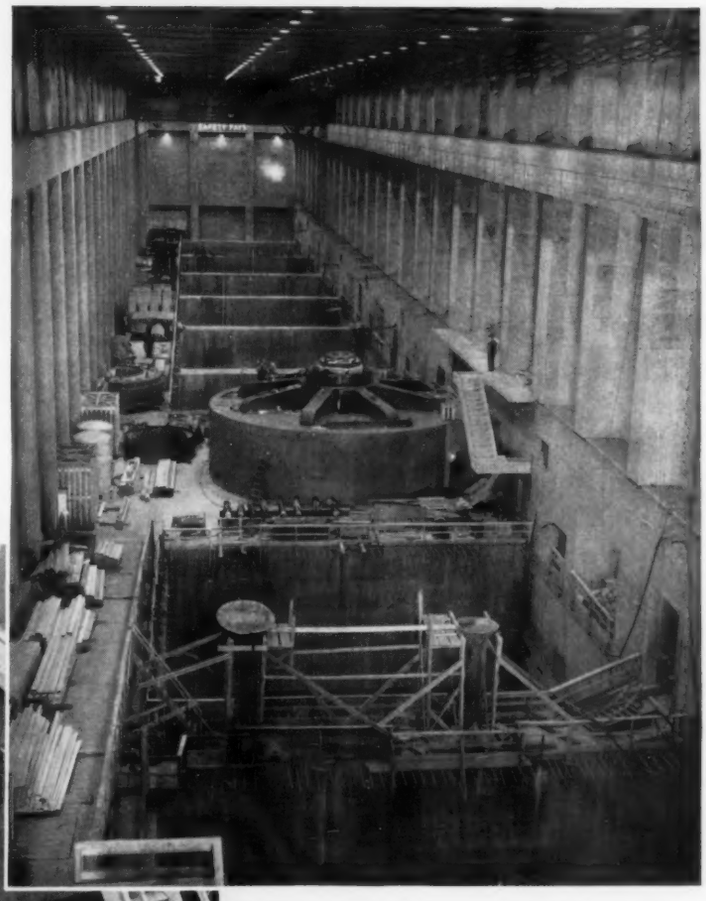


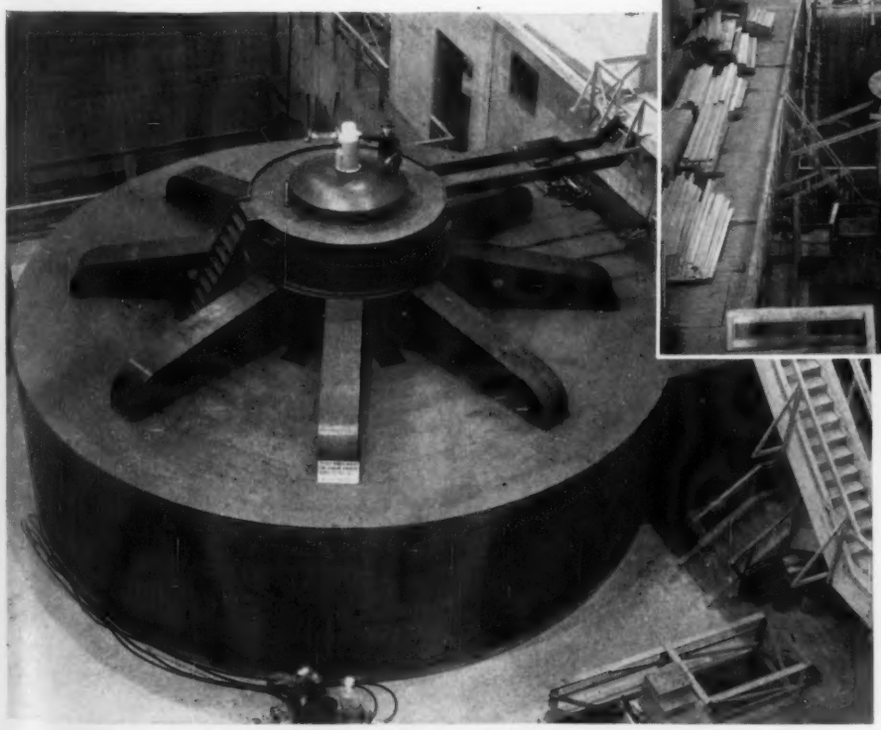




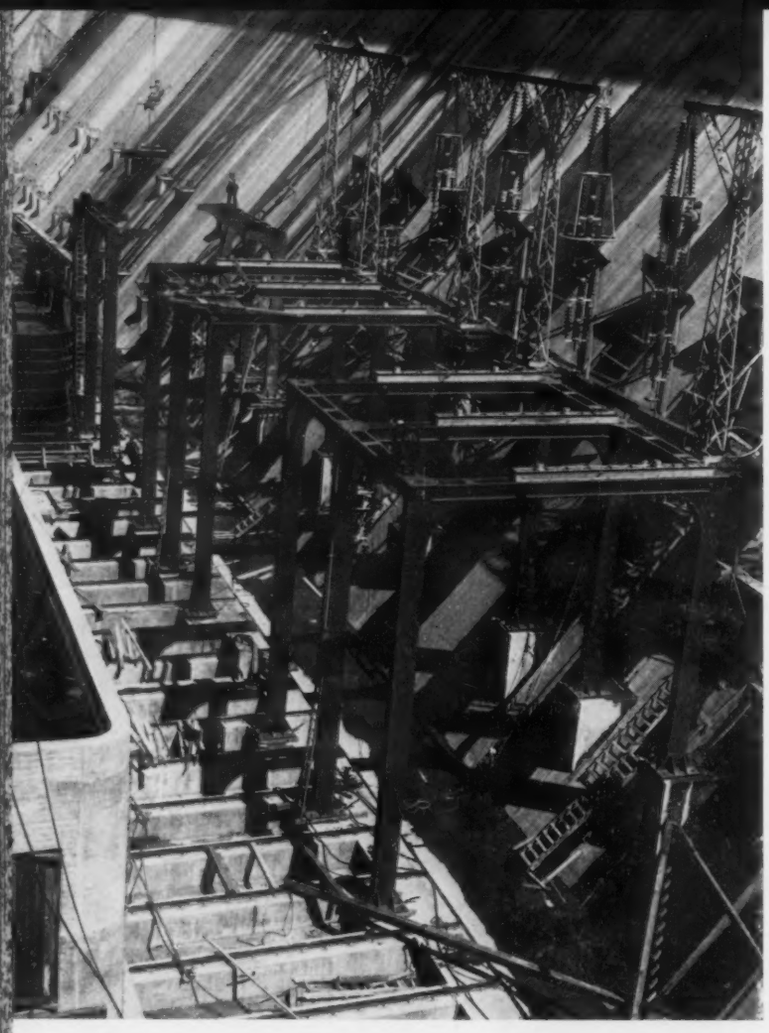
GENERATORS

MAIN GENERATORS, supplied by Westinghouse Electric & Manufacturing Co., are 45-ft. diameter, 3-phase, 60-cycle, 13.8-kv., totally-enclosed, air-cooled machines rated 108,000 kw. at 100 deg. C. Inorganic insulation to stand an operating temperature of 120 deg. C. was specified as a means of insuring overload capacity and long life. Short-circuit ratio is 1.75 or more. Stator windings are connected 11 coils in series and 12 coils in parallel in each phase. Generator windings are star-connected. Stator frames are 37 ft. in diameter and are fabricated of welded steel plate in quadrants. Rotors were assembled on a special fixture set up in an unoccupied turbine pit. Air-operated brakes permit quick stopping of the machines. By substituting oil for air, the brakes become hydraulic jacks for raising the entire rotating load. Power for excitation is supplied from motor-generator sets driven by the station service units. They consist of 600-hp. synchronous motors driving 400-kw., 240-volt d-c generators with a direct-connected pilot exciter.





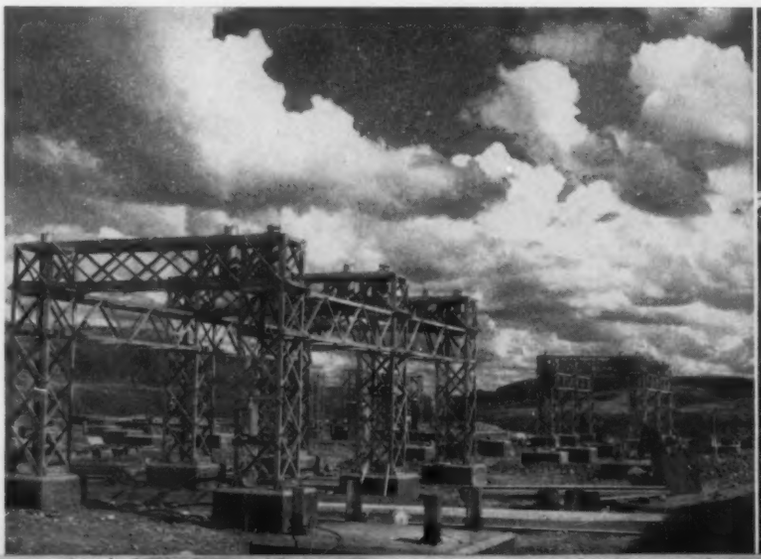
A KINGSBURY-TYPE THRUST BEARING designed to carry a gross load of 1,000 tons at 400 lb. per sq. in. of bearing surface is mounted on the upper generator bracket. It consists of an 8-ft. cast iron thrust collar, attached to the end of the generator shaft by means of a steel hub, and eight babitted steel thrust shoes supported on pivots. The thrust bearing and the upper guide bearing run in a bath of oil.

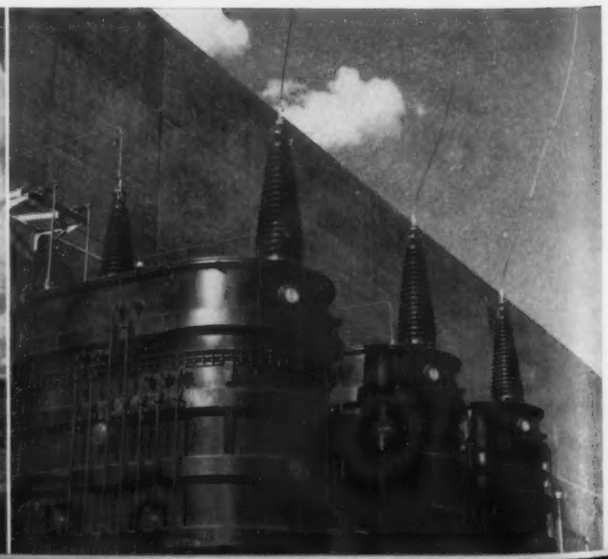


ELECTRICAL FEATURES

TRANSFORMERS AND SWITCHES are arranged on an open deck between the power house and the face of the dam. Lightning arresters are supported on pedestals on the downstream face of the dam (see above). Structural steel towers support the disconnecting switches and de-icing switches. These latter apply energy from one of the house generators for snow and ice removal. Control cables generally are supported on racks run in galleries while power distribution cables are run in conduit (right, above and center). There are several such multi-purpose galleries.

EACH 108,000-KW. GENERATOR delivers its output to a bank of three General Electric 36,000-kw. single-phase transformers which step the voltage up to 230,000 (below right). Transformers are outdoor, water-cooled, gas-filled type, each containing 50 tons of insulating oil. They were shipped in parts and assembled at the power house. Connections with generator leads are made through I.T.E. enclosed isolated phase buses. Four mats of bare copper cables 200,000 to 500,000 circ. mil section, one under each power house and one under the riprap of each tailbay, provide connections for all electrical equipment. View of switchyard is shown below.





STATION SERVICE

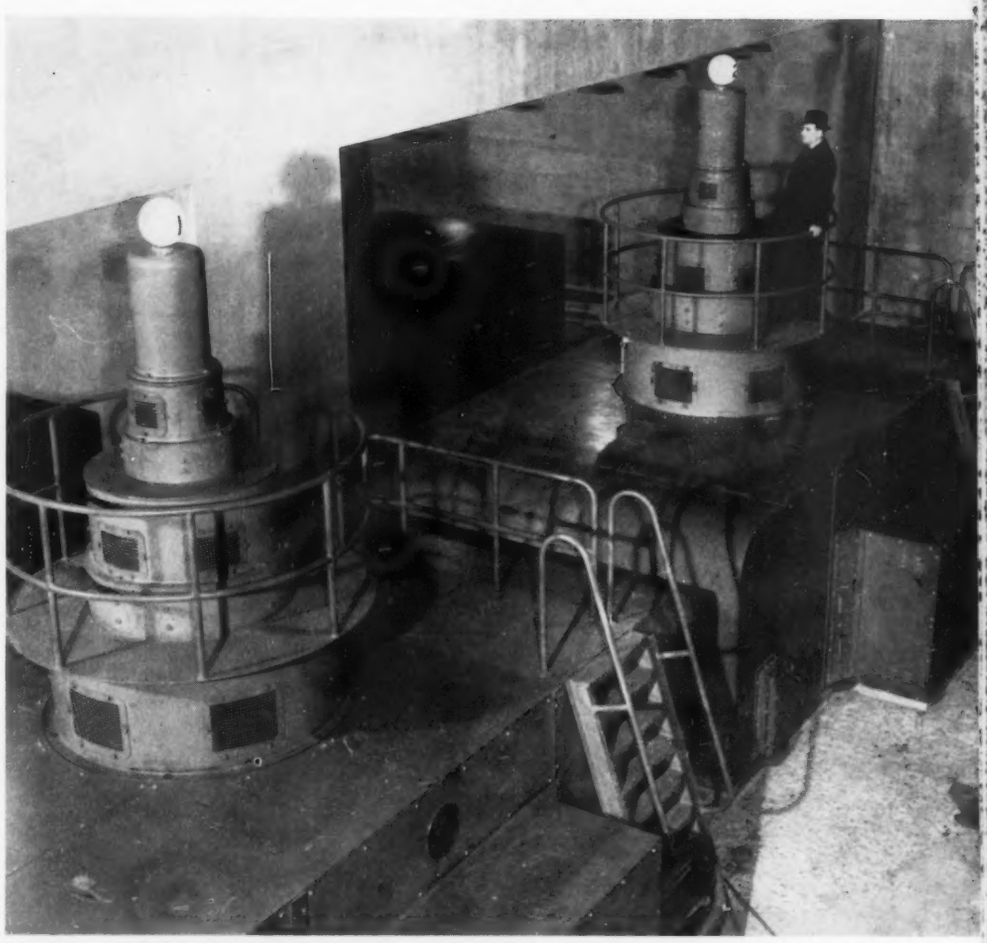
THE STATION-SERVICE generating plant contains two of the ultimate three units to be installed (right). Each consists of a 14,000-hp. Pelton Francis-type reaction turbine connected to a 10,000-kw., 6.9-kv. 3-phase, 60-cycle, 400-rpm. Westinghouse three-phase a-c generator.

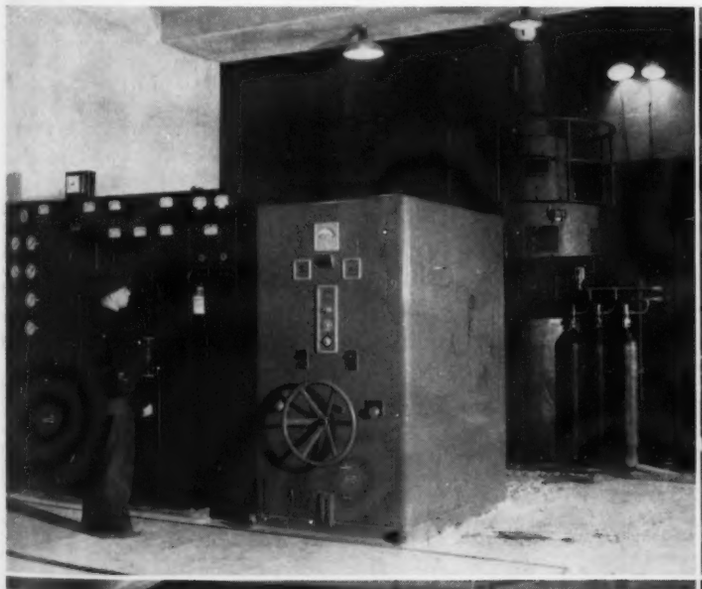
CONTROL EQUIPMENT for each station-service unit is located adjacent to the machine (below left). It consists of a Woodward governor mechanism completely enclosed in a steel cabinet and beside it a generator control panel. The units are provided with carbon dioxide fire extinguishing equipment automatically controlled.

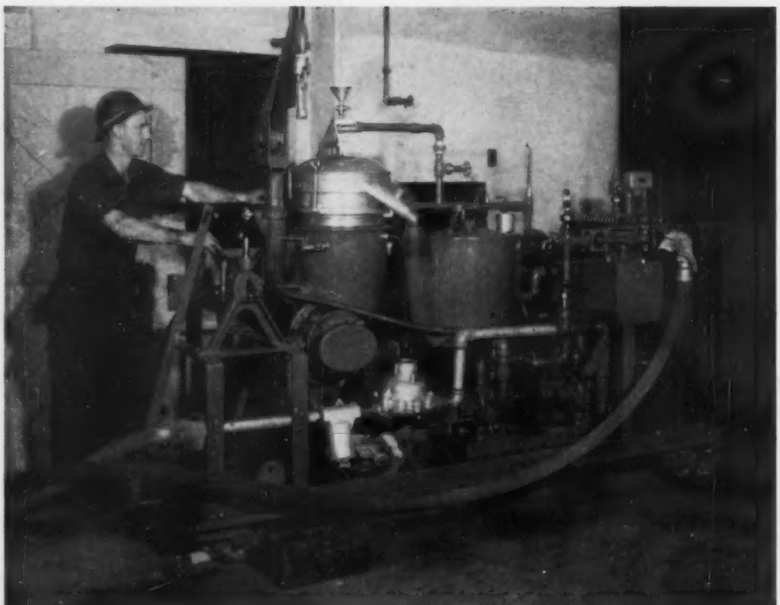
DOUBLE-BUS METALCLAD switchgear equipment with withdrawal type oil circuit breakers, is provided for distributing power at generator voltage (below right). Exciters for the first six main generators and the power and lighting systems of the dam and townsite constitute the 6.9-kv. load served from the station units.

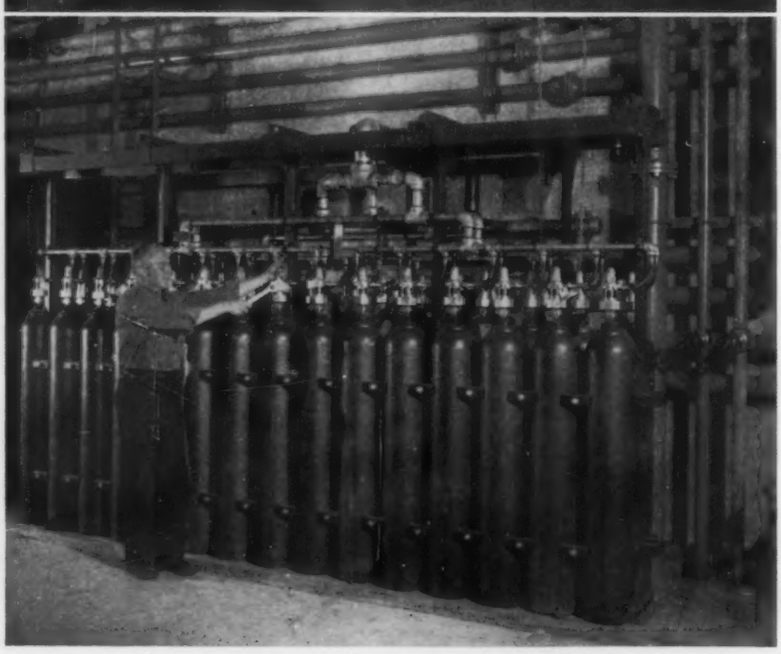
STORAGE BATTERY is an acid-type 120-cell 250-volt unit that furnishes energy for the operation of control and relay systems as well as for emergency station lighting (bottom left).

FOUR BANKS OF TRANSFORMERS taking energy from the station service units step the voltage down to 115, 230 and 460 volts for use in power and lighting circuits (bottom right).









MISCELLANEOUS

OIL STORAGE for both lubricating and insulating oils is provided in tanks located in a lower section of the control bay (above left). Oil is received in tank car lots and storage is provided for both new and used oil. Oil headers extending the length of the power plant permit pumping to or from any power unit as conditions dictate.

COMMUNICATION FACILITIES include an automatic telephone exchange in the control building, connecting all local USBR telephones through trunklines to the Bell system; an inter-communicating system in the power house for emergency use; a code-call system capable of operating audible signals throughout the plant from any Bureau phone; and carrier current telephone equipment (above center) operating over the transmission system to keep the operating staff in touch with the load dispatcher.

GALLERIES occupy the space between the power house and dam under the transformer deck. Several of them are used for busbars, cables and conduits. Shown (above right) is the gallery that carries power distribution conduits and cables, including some installed for temporary use during construction which will be removed later.

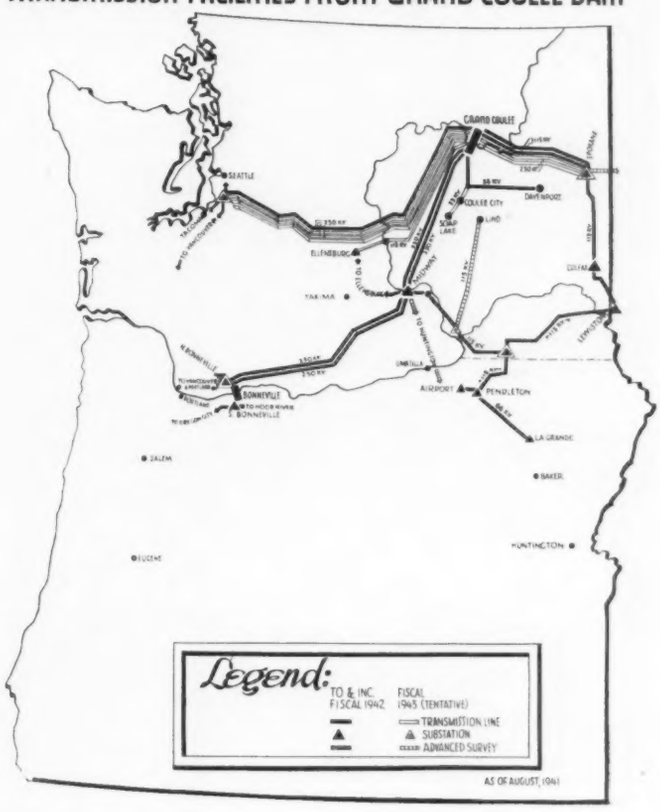
OIL PURIFYING EQUIPMENT has been made portable. A centrifugal purifier, a filter and automatic heater, and meters, pumps, gages and pipes have been mounted on a simple truck for use in various parts of the plant (left center). The unit is designed to handle lubricating, governor and insulating oils throughout the whole plant.

CARBON DIOXIDE FIRE FIGHTING equipment is installed for protection of oil storage tanks as well as the main generator units. One battery connected to suitable headers, pipes, valves and thermostats, protects the oil storage tanks (bottom left). A similar bank is provided for each group of three main generators. One group under automatic control will reduce the combustion content of gases within the generator enclosure to a value below 66 per cent. Another group is manually operated.

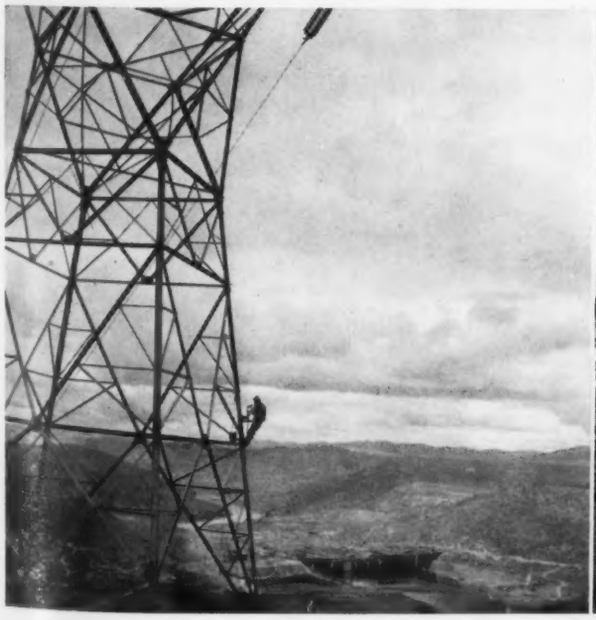
TRANSMISSION

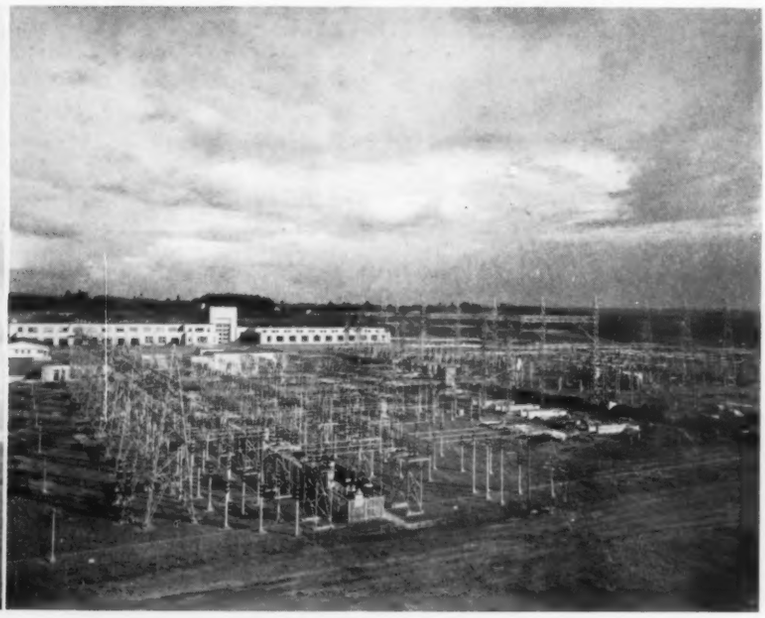
POWER from Grand Coulee will feed into the major grid or "transmission backbone" operated by the Bonneville Power Administration. This system is capable of being strengthened as needed and from it lighter transmission networks radiate (see map right). Ultimate generation at Grand Coulee of 1,296,000 kw. for purely power purposes, and 518,000 kw. at Bonneville, will represent over one-sixth of the potential 10,000,000 kw. which can be generated by the Columbia River. The Bonneville "backbone" grid consists of a high-voltage, multi-loop system connecting the major generating and load points. It is, in effect, a continuous bus fed by high capacity plants serving major substations. From the latter, lines radiate to specific loads and load areas. Power over the system is at 230-kv. The first elements built were from Bonneville to Vancouver, Wash. These were followed by the Bonneville-Coulee lines and the Bonneville-Chehalis line, the latter now extending as far north as Covington substation. Completion of the Covington-Coulee line is slated for June, 1942, and it will close the major transmission loop. Final design work on the second line from Bonneville to Grand Coulee is progressing and a third Bonneville-Vancouver line is also in the design stage. In addition, two 115-kv. lines are under construction from Grand Coulee to Spokane, Wash. Their combined capacity equals that of one Grand Coulee generator.

TRANSMISSION FACILITIES FROM GRAND COULEE DAM



STEEL TOWERS of the 230-kv. line (left) between Bonneville and Grand Coulee range up to 80 ft. in height. The Bonneville-Grand Coulee line is 135 miles long with right-of-way 200 ft. wide. Plans call for multiple circuit construction. All 230-kv. lines are considered as Class 1 lines, of steel tower construction throughout. All 115-kv. lines are generally supported on wood pole, H-frame structures. Lower voltage lines will be built in accordance with terrain traversed and service for which they are designed. Lineman is checking line sag (lower left panel) on 230-kv. construction near Grand Coulee Dam. Upstream side of the dam is visible in the background. General view of the J. D. Ross substation, formerly known as the North Vancouver substation, is shown in the lower right panel. Untanking towers, warehouses and shops for the Bonneville network are in the background.

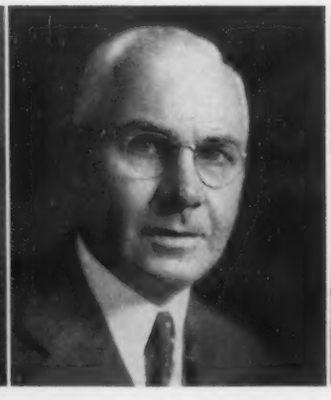




Grand Coulee Personnel Enjoys Model Community

A VILLAGE of two or three thousand people will be permanently stationed at Grand Coulee dam on operative, maintenance and administrative work. To accommodate the families of these employees in the power house, dam and organization in charge of the irrigation phase of the project, the model town shown above is provided with permanent homes and service facilities. Left is a close-up view.

DIRECTLY RESPONSIBLE to the Department of the Interior for progress of the Coulee Dam project was John C. Page (left), Commissioner, Bureau of Reclamation, Washington, D. C.; S. O. Harper, Chief Engineer, Bureau of Reclamation, Denver, Colorado (right), is in charge of all construction activities of the Bureau. Left to right in the bottom panel are: Frank A. Banks, Supervising Engineer, Coulee Dam, Washington, who was in immediate charge of Grand Coulee work; Alvin F. Darland, Construction Engineer, Bureau of Reclamation, Coulee Dam; J. L. Savage, Chief Designing Engineer, Bureau of Reclamation, Denver, Colorado, and L. H. McClellan, Chief Electrical Engineer, Bureau of Reclamation offices at Denver, Colo.



ELECTRICAL WEST Sales Guide

That's why salesmanship was born

Not "to plow de cotton, or to plant de corn"—but to plow the market and to plant new products and ideas, that's why salesmanship was born.

That's why salesmanship must be kept alive too. Somebody's got to keep the market cultivated or it will pass away to other products. Without continued selling of even a limited volume of merchandise, large numbers of the new customers, the young couples just starting new homes, for instance, will not learn what they should about the benefits and advantages of electric labor-saving, convenience-bringing table appliances.

Part of salesmanship is to advise the public in a friendly, helpful way, of these available benefits. Often they are not obvious, even if they have grown familiar to an older generation—that **has** been taught by salesmanship. Clientele is something that has to be worked on by continued salesmanship. Because a product is accepted now is no guarantee that it will remain so if people are allowed to forget. Business must go on. New outlets must be found if old are stopped. In place of some no-longer-available wares others can be sold. Thousands of new homes are being established. Unless they are told the story of electrical comfort and helpfulness now, when the emergency is over the job will be harder by far. Today's customers cost years of promotional effort and salesmanship.

That's why salesmanship must go on!

Always, new homes are starting.

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TABLE COOKERY

NOVEMBER 1941

TABLE COOKERY

Selling is fun

WHEN YOU KNOW YOUR STUFF!

Perhaps a little scarcity will develop a real appreciation of electrical appliances; ever think of that angle? In the lush times they were so easily available that they were taken for granted. The deep-down time-saving and labor-saving and food-saving—now more important than ever—values were not appreciated when time was on everyone's hands, domestic help was easy to hire, and food so plentiful and cheap that it could be wasted without a thought.

But today it's different. There's a demand for all the time to spare, domestic labor is scarce when defense calls it all at more attractive wages, and with food prices on the rise and food scarcity facing the future, food saving is a real necessity and better nourishment a national duty. In this sort of situation "angels themselves couldn't do better" for us than to supply the help that comes from electric appliances.

Scarcer perhaps in your stock, but each one worth its weight in gold to the purchaser when used to its fullest. That makes **a new theme,** a new sales slant for you. It is one that will sell the value and use over the increases in price and taxes. This is the time to correct many of the old evils of cut price and cheap merchandise. Prices can stay firm and profit per sale relatively stronger so that even with less volume there's still a good living. Term restrictions will correct wild, uneasy financing, too.

It is no time to coast on momentum. **You don't coast up hill.**

So tune in on the new theme of benefits and services performed—tune out a little on the old luxury appeals.

Angels couldn't do better!

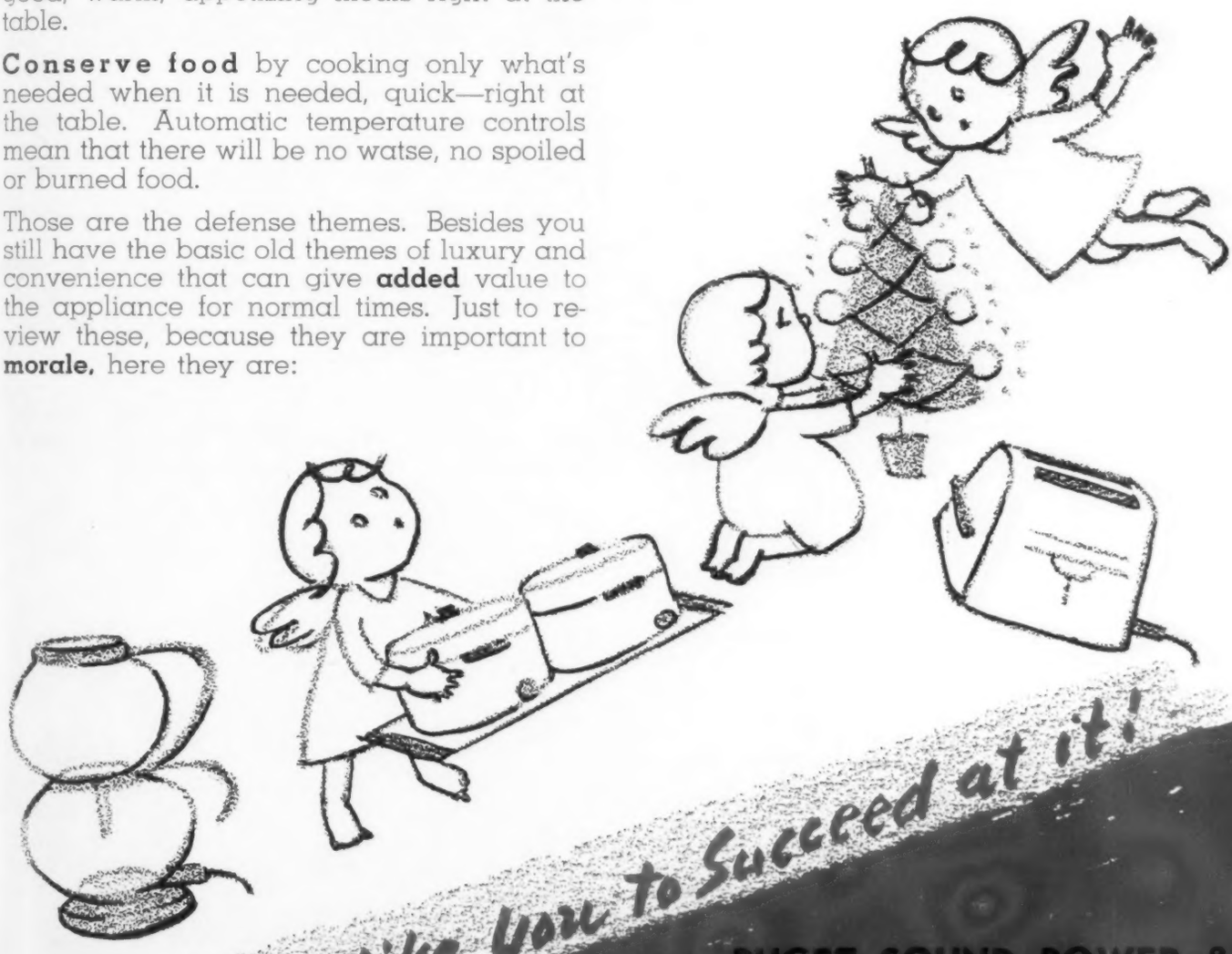
Translated into today's theme, this is what table appliances can mean to your customers. It is **why** they should **buy:**

Quick meal preparation—saving time and fuss. If meals are to be provided at odd hours for shift workers, for a quick early start in the morning, table appliances make possible good, warm, appetizing meals right at the table.

Conserve food by cooking only what's needed when it is needed, quick—right at the table. Automatic temperature controls mean that there will be no watse, no spoiled or burned food.

Those are the defense themes. Besides you still have the basic old themes of luxury and convenience that can give **added** value to the appliance for normal times. Just to review these, because they are important to **morale,** here they are:

"Be a guest at your own party, serve from the table instead of the kitchen. Ideal for buffet entertaining. Just the thing for a late snack after the show. Add sparkle and beauty to your table. Gives you a reputation as a clever hostess."



and We'd like You to Succeed at it!

PUGET SOUND POWER & LIGHT CO. . WASHINGTON WATER POWER CO. . PORTLAND GENERAL ELECTRIC CO. CALIFORNIA OREGON POWER CO. . UTAH POWER & LIGHT CO. . IDAHO POWER CO. . THE MONTANA POWER CO. . ROCKY MOUNTAIN ELECTRICAL LEAGUE

"Stuff" to Know

Spruce up for Christmas

Common sense is not any too common. It tells us that old tried and true things still work even if we are used to them and yearn for something new. But see how new a woman can make her house look by moving the furniture around a bit. Same with a store. If the "priority blues" make an overhaul out of the question, spruce up by changing things around to make them look new—at least different. That's just sense. But worth trying.

More common sense, just as a reminder—Gay the store up. Light up more than usual. Put the merchandise out more, so that shoppers can see it, feel it, touch it. Mark prices plainly. If you are rushed it helps many to select and buy quickly, as they do in the cash-and-carry markets. Feature higher priced merchandise more, better grades. Gift buyers want a little better than ordinary. Segregate displays of certain kinds of appliance, yet show matched sets together. Play up pattern.

Begin advertising early and do more than run of the mill. Feature the merchandise, not prices. Make gift suggestions. Play up the lasting value, the usefulness of electrical gifts. It all pays.

Most of all, keep happy. It is infectious.

Way ahead in the Vitamin Parade

Great talk these days of waterless cooking to preserve vitamins. Great talk of proper feeding of the nation. Remind your prospects that the first waterless vitamin saving cooking was discovered to be the electric way and has always been its best performance. Other types of ranges are just now attempting to imitate what is done to perfection electrically.

It's a mixed up old world

But there is no mixup in the values to offer a prospect for an electric mixer. Defense may make them hard to get, but it is worth selling your quota of them thoroughly so that when the glad day arrives and plenty are again available those who bought from you will be your best advertisement. There will be more in it for you if you sell up to the full capabilities of the never-tiring little kitchen helper, the electric mixer.

Freshen up your sales story on the benefit side. Gadgets are in the background these thrifty days of metals and materials, but the basic benefits still sell. In case they've slipped you lately, here they are in shorthand. You can talk them in your own language, enthuse over them aplenty.

1. Speed up meal preparation — important these busy defense days. 2. Save the hands from cuts, scraping, and stains. 3. Save the arm muscles from tedious beating and stirring. 4. Make smoother mixtures, insuring repeated success. 5. Home prepared foods save money, aid the defense program. 6. Improved food appearance by shredding and slicing—ideal for waterless cooking. 7. Versatile and modern.

"Stuff" to do

There will always be a Christmas

Neither bombs nor blitzes can blast Christmas from the earth. In this more fortunate land the tiny lights of cheer and hospitality will glow outdoors sans blackout, sans fear. Citizens of a freer country will bedeck their streets with twinkling color, their homes and gardens with brilliance, spread happiness and hope to those who travel past. These tiny lights, lavished everywhere in the West, are symbols of a return someday of Peace on Earth, Goodwill to Men. Let their light so shine in every community, every home, every city, that there shall be kept aglow a will to see it spread again to all the world.

What's New in Sales

—New PP&L policy

—San Diego annual show

—Excise tax no worry

In retiring from the direct sale of major appliances, Pacific Power & Light Co. with headquarters at Yakima, Wash., makes a statement to the trade in the Oct. issue of "Dollars to Dealers" from a letter by Paul V. McKee, president of the company:

"After careful consideration of all phases of the problems and opportunities of Pacific Company, with particular emphasis on a need to meet the demands of cooperation in national defense, steps will be taken toward the company's retirement from the direct sale of major appliances, thus placing in the hands of electrical dealers as much as is practicable of the merchandise volume now handled by the company. With manufacturers' output of major appliances facing sharp curtailment as the result of material shortages, it is also desirable that dealers of the territory served should have access to the full number of units that will be available for sale in this area. Sales efforts will continue but will be directed toward the sale of the company's service rather than appliances."

No change, however, was contemplated in the company's present program of direct sales of lighting equipment and small appliances, according to D. B. Leonard, commercial manager, who stated that "As in the past, every practical sales aid will be given dealers. Service advertising will be maintained through newspapers, radio, direct mail, etc. Company sales supervisors in each district will continue to work closely with dealers to furnish sales leads, present sales training materials, operating cost estimates, etc."

Analyses of the company's sales indicate that the volume done by the company was approximately 7% of the total, and 93% by dealers.

The Show Goes On

Over 300 appliance industry people crowded the Hotel Grant for the annual banquet of the Bureau of Radio and Electrical Appliances of San Diego County on the evening of Sept. 17. A very favorable reception was given the announcement that Bureau advertising and sales helps for the entire industry will not be curtailed, but augmented. Appreciation towards the manufacturer-distributor viewpoint was given by numerous executives speaking impromptu. Among the speakers were Shorty Sherman, Joe Spain, Si Frellson, Sam Scott, Major Anderson, "Ponzi" Kauffman, Tom Sexton, Fred Lindquist, and Raymond Haan. Climaxing the show was an address by Dr. Frederick P. Woellner, who admitted with becoming levity that it was probably his greatest speech.

Former exhibitors and prospective new exhibitors are being urged to participate in the 9th Annual Electrical Show to be held in Balboa Park Nov. 25-30, under the auspices of the Bureau. Also numbered among the Bureau's immediate activities is the distribution of 50,000 new radio logs.

● Confusion Existing over what policy to follow in relation to the excise tax collections on appliances is answered by the fact that this is a manufacturers' tax so far as appliances are concerned, according to J. Clark Chamberlain, manager of the Bureau of Radio & Electrical Appliances of San Diego County. "Prices should not be changed until manufacturers or distributors formally announce new lists, and then the tax will be included in the new prices. Radios and refrigerators have been sold for years with a 5½% excise tax of exactly the same nature and now it is really 10% total on these same items, plus inclusion of others," stated Chamberlain. "We and the public have long since forgotten there was a tax on radios and refrigerators and the sooner we forget the new one the better our sales will be," concluded the Bureau manager.

CLASS OF SERVICE

This is a full-rate Telegram or Cablegram unless its deferred character is indicated by a suitable symbol above or preceding the address.

WESTERN UNION

1201

R. B. WHITE, PRESIDENT — NEWCOMB CARLTON, CHAIRMAN OF THE BOARD — J. C. WILLEVER, FIRST VICE-PRESIDENT

SYMBOLS

DL = Day Letter
NT = Overnight Telegram
LC = Deferred Cable
NLT = Cable Night Letter
Ship Radiogram

Time of receipt is STANDARD TIME at point of destination

CA19 63 GOVT NT 1 EXTRA=WASHINGTON DC 2

ELECTRICAL WEST=

68 POST ST SFRAN=

WE REQUEST THAT THERE BE NO PYRAMIDING OF THE FEDERAL MANUFACTURERS EXCISE TAX. THE INCREASE PRICES PAID BY CONSUMERS AS RESULT OF NEW LEVIES SHOULD IN NO CASE REFLECT MORE THAN ACTUAL DOLLAR AMOUNT OF TOTAL EXCISE TAX. THIS POLICY SHOULD APPLY WHERE EXCISE TAXES ARE CONTINUED AND INCREASED AS WELL AS WHERE TAXES ARE NOW BEING LEVIED FOR THE FIRST TIME=

LEON HENDERSON S ADMINISTRATOR

OFFICE OF PRICE ADMINISTRATION=

THE COMPANY WILL APPRECIATE SUGGESTIONS FROM ITS PATRONS CONCERNING ITS SERVICE

A Speaker's Notes

Meetings in the Northwest told this basic story of sales opportunities and appeals in lamp service

By Bert Heinz

Northwest Representative, Light Conditioning Sales Service, Seattle

THIS is the beginning of the second year in a *five-year program of complete home light conditioning* which includes the use of:

—IES lamps, pin-it-ups, modernizers, adapters, and new light fixtures.

—Importance of adapters and new ceiling fixtures is shown by a national survey which reveals that:

There are 22 ceiling sockets in the average home.

64% of total lamp bulbs in the home are used in ceiling sockets.

Average wattage in use is 44 per socket, 68 per fixture.

—These facts at once present a great opportunity, and disclose an alarming fact—an insidious fatality has reduced the wattage originally installed, to the low averages found in actual use. Two common habits account for this loss of load:

A. In often-used cluster, candelabra, and other multi-lamp fixtures, all but one lamp may burn out before replacement is absolutely necessary.

B. Lamps can easily be and frequently are replaced with smaller and smaller bulbs; fixture is usually washed at this time, and even with smaller lamps, user thinks she has more light.

Bert Heinz demonstrates

Harmfully inadequate lighting is found in almost every home today. The need for light conditioning is obvious to everyone in the industry.

Why silver bowl lamps—in view of other fixture types available?

—*Standardization* for campaign.

—*Available to all dealers*—fair to all, in contrast with other types in which some dealers buy from jobbers, some direct from manufacturers.

—*Profit interest*—always necessary to get full cooperation:

Lamp mftr. Jobber Dealer Utility	Increased lamp sales. Northwest jobber reports 1940 over 200% above 1939 in all silver bowl sizes, 600% in 100 and 150 watt silver bowls. This is true gauge of retail lamp business.

All in addition to profits from fixture sales.

—*Utility special interest—revenue.*

Greatly reduced load fatality, because:

A. Fixtures use single lamp and single filament; the moment it burns out, it must be replaced. (Excepting clip-ons for ceiling cluster types).

B. Silvered lamp is integral part of fixture design, and a lamp smaller than original is obviously out of place.

Salesmen: Here are your selling points—build your story with them.

User satisfaction—best reason. Approach must be from this standpoint.

—*Elimination of glare is first requisite,* or load-building effort is doomed to failure.—Jim Ketch.

—*Initial high efficiency.*

(a) One large lamp instead of several small bulbs.

25-watt, 10.0 lumens output per watt
40-watt, 11.6 lumens output per watt
100-watt, 16.3 lumens output per watt
150-watt, 17.4 lumens output per watt
200-watt, 18.5 lumens output per watt
5-40's give 2320 total lumens
1-200 gives 3711 total lumens, 60% per dollar electric cost.

(b) Silver reflector — highest efficiency; filament permanently in focal center, same advantages as sealed-beam auto headlight. No possible focal center in multi-lamp types. Not dependent on reflectivity of fixture surface.

(c) Comparative efficiency—quoting C. E. Weitz, G-E, Nela Park:

"Silver bowl fixtures, 75% to 91%
All others (single-lamp types), 60% to 84%
75% of 3711 equals 2783 lumens output from 200w silver bowl unit.
60% of 2320 equals 1392 lumens output from 200w multi-lamp unit.
Silver bowl initial output is twice as great in this case.

—*Uniformity of ceiling brightness.* Comparison of typical curves shows 80% greater brightness from others than from silver bowl units.

—*Maintained efficiency.*

(a) Vertical lamp position—blackening concentrates more in neck of lamp far above filament, whereas in multi-lamp fixtures lamps burned in horizontal position suffer maximum depreciation because blackening occurs on lamp bulb directly above and around filament, where light output *should* be greatest.

(b) Dust, insects, etc. have least possible effect due to sealed-in reflector. Dust on lamp-neck only has appreciable effect.

(c) Chimney effect—space between lamp and lamp-ring permits free flow of upward air currents which effectively prevent accumulation of dust on lamp during operation.

(d) *G-E lighting design credits silver bowl units with 75% maintenance factor against 60% for other indirect units, 65% for glass or plastic bowls.* This is for single-lamp units; multi-lamp types would be far worse due to difficulty of cleaning around, under, and between lamps. Dust accumulation would be worse on lamps in horizontal position, same as blackening effect.

—*Varied attractive designs, functional* in motif; streamlined, modern.

Satisfied users build repeat customers for dealers—boosters for utilities!

United front on complete line.

—Glass fixtures are improved designs, but still suffer by above comparisons. Manufacturers will be increasingly active. Dealers who buy at longer discounts naturally inclined to push them. Many beautiful designs — they have rightful place in the field.

—Customer and dealer should be told silver bowl user advantages; this is only fair, and buyers can then make intelligent choice.

—*Complete wired units* should be in-

WHEN MAJOR APPLIANCE STOCKS RUN SHORT

cluded in recommendations, because:

(a) User gets maximum advantages of silver bowl lamp with more attractive fixture.

(b) Contractor-dealer interested in installation work and higher profits; will support program better if not restricted to adapters.

—*Adapters* and modernizers should be used chiefly when immediate sale of complete fixtures cannot be made. Their field is still tremendous.

(a) Especial advantage to transients —can take adapters along.

(b) Hardware, variety stores, etc. interested mainly in adapters.

Total cost of light-conditioning average home for 5 years:

Initial purchase	$ 64.00
Increased lamp renewals	8.00
Increased electric cost	100.00
Total cost, 5-year period	$172.00
Cost per day, only	.093

Compare with cost of cigarettes, etc. which benefit only one member of family, while light conditioning is *real* benefit to whole family.

A Few Suggestions:

—*Use 150-watt silver bowl process demonstration lamp* (75c) to arouse interest, to justify replacement cost, and as basis for light conditioning story.

—*Use Light Conditioning Handbook* as visualizer and to help properly recommend light conditioning equipment.

—*Use complete Vision-Aid and Sight Saver catalogues* to show wired units and to allow choice from complete line.

—*Self-education.* Every employee working on light conditioning should light-condition own home to become fully enthusiastic and sincere.

—*Dealers* should light-condition their own homes and those of their employees to sell them, both on the equipment and on their own service.

—*Jobbers.* Most salesmen need same education as badly as dealers. Factory and utility have joint responsibility to build up their support.

—*Caution!* Avoid mistake of recommending silver bowl or any other indirect or translucent bowl types for use on ceilings that are too dark. In such cases re-painting should be included in the recommendation.

—*Cleaning enamel finishes.* Finger marks or other stains are most easily removed by use of common tooth powder with damp cloth.

A good watch-word—"*Light Conditioning for Permanence.*"

(a) Permanence of added load.

(b) Permanence of user satisfaction.

Campaign keynote—"*Light Conditioning for Defense.*"

(Puget Sound Power & Light Co., 1941 Campaign.)

Well-taken, because—although the first Crusades were during the Dark Ages, we are now crusaders against darkness for all ages.

For Mother and Father, Sister and Brother, whatever their evening occupation—our modern crusade will banish darkness, gloom, worn eyes and frayed nerves; will replace them with brightness and good cheer, warmth, comfort, and homey relaxation.

Yours is a noble calling, for the benefits you bring; keep that well in mind as you go forth on this 1941 Crusade to teach the Light Conditioned Way of Life.

Dealer Clinic

Puget Sound mobilizes entire industry for lighting drive

TO tide dealers through the defense famine of appliances, light conditioning is being advocated in virtually all regions of the West. Some territories are turning their full concentrated effort into light conditioning with vigor and thorough organization which has characterized major representatives are also listed.
appliance drives in the past. The full selling forces of some progressive utility companies are being trained anew to the job of creating the strong market for dealers. Quite generally the program of the utilities is wholly to create the market and to direct the sale of merchandise through the dealer.

One of the most thoroughly organized campaigns of this kind is on the lines of Puget Sound Power & Light Co. in Washington. Not only is the utility personnel being mobilized for the program but a series of training meetings is being conducted for dealers and dealer employees to aid them to sell more light conditioning equipment and to educate the public on the need for light conditioning through group meetings of the public addressed by home service representatives of the utility. A brief outline of the campaign organization will indicate its thorough and intensive character.

Theme for the program is "Light Conditioning for Defense." Duration is the last quarter of 1941. The theme is defined as defense for profits of the electrical dealer who has difficulty in obtaining other types of electrical merchandise, defense of young eyes, defense of home and farm from accidents and hazards and defense of production workers' eyes.

Dealers and dealer employees were called together for a series of "opening gun" meetings in Bellingham, Everett, Puyallup, Olympia, Chehalis, Bremerton, Wenatchee, Renton, and Seattle during September and October. A prospectus of the entire campaign was given to them and then they were invited to a series of clinics to be held approximately 10 days apart during October and November in each of the same towns. At the latter clinics, Mrs. Edith T. Rauch, C. T. Bakeman and Charles Hess, the text "New Light on Selling Light," a condensation of the La Salle home lighting course provided by General Electric Co., was covered thoroughly to prepare dealers and dealer sales people to tell a consistent and effective light conditioning story to their customers. For those who could not, for one reason or another, attend the clinic a supplementary group of meetings was carried on by district personnel to review the same work.

To reach the public and interest it, group meetings were carried on in each district and division by the home service representatives, commercial and industrial representatives and farm electrification representatives, meetings of farm groups, Chambers of Commerce, service clubs, women's organizations,

First ad used in the Puget drive

Light
CONDITIONING
FOR DEFENSE
MAKE AMERICA STRONG by making Americans stronger!
Begin when these Americans are young by protecting their precious eyesight with proper lighting. An addition of a table lamp or student desk lamp will do the trick to safeguard these young eyes at work or at play, and help keep them strong when needed so badly in later life. Look into the future. Have your home, from cellar to attic, LIGHT CONDITIONED now! Under Puget Power's low electric rates a light conditioning program is really inexpensive—for instance, the average domestic and farm customer on Puget Power Lines can add a 200 watt I. E. S. lamp for approximately only 45 cents per month.
Ask any Puget Power office how you can qualify for the All-Electric Rate
See Light Conditioning Fixtures at
YOUR ELECTRICAL DEALER
DEDICATED TO NATIONAL DEFENSE
PUGET POWER

LIGHT CONDITIONING SALES TAKE "PRIORITY"

PTA's and others were thus addressed. "Ammunition" for the dealer "selectees" was furnished in the form of lighting conditioning publicity handout pieces. "Artillery" of strong advertising boomed away ahead of the campaign in daily, weekly and community newspapers throughout the territory.

Simultaneous with the dealer program, one for company employees was held on the morning of the same day the dealer meetings were held. Similarly, clinics for the promotional employees was held on the morning of the same day the dealer meetings were held. Similar clinics for the promotional employees were held each time a dealer clinic was staged.

The farm electrification section was assigned definite quotas of calls on rural customers, to conduct demonstrations of lighting and wiring kits and to obtain publicity in the rural papers. The home service section was assigned a definite quota of lectures before women's organizations, etc. They were also to give a certain number of store demonstrations on light conditioning in dealer stores. They were also to make home demonstrations upon requests from dealers. The commercial and industrial sections were to arrange demonstration lectures before the service clubs, Chambers of Commerce, etc. They, too, had quotas of architects, engineers, industrials and offices to call upon. As additional stimulus, prizes were offered the company personnel for the best performance in organizing their own territories and dealers. The commercial and industrial groups were given additional quotas on what was called "KW conditioning for industry" and "electrical conditioning for restaurants," with definite bonus points for KW of new load created in these fields.

Supplementing all this effort was a lamp bulb activity for local offices and floor salesmen. Shopping bags were furnished districts and divisions in which to sell lamp bulb assortments. On the side of the bag was printed a light conditioning guide chart. Prizes were offered in this activity for the best performance by division or district.

According to Pat Johnson, general sales manager, and Henry R. Kruse, sales promotion manager, a very generous response was had from dealers in both the preliminary meetings and the clinics. "We feel that this is an opportune time" said Kruse, "to carry on a lighting program inasmuch as there are shortages of some other electrical equipment while there does appear to be a reasonable supply of lighting equipment and also considerable public demand and acceptance for it."

It was also pointed out in dealer meetings that aside from general increased public acceptance of new lighting, a greatly increased market has been created in the number of rising incomes and new homes being constructed. A good profit margin with very few service or guarantee problems, and a greater proportion of the business done over the counter, are in its favor. That light conditioning equipment can serve to take the place of some of the lost volume of major appliances and later provide adequate volume when adequate stocks of major appliances are again available was likewise emphasized.

Dealers' First

Lamp campaign in Northern California opens new field

HOME lighting may be as old as Edi but for the first time in northern California a concerted drive by electrical dealers on home lighting equipment was conducted during the week of Sept. 15-22 under the sponsorship of the Electric Appliance Society of Northern California and the Pacific Gas and Electric Co. Unit sales results are not yet available but there is evidence that dealers recognized home lighting equipment as a potential stopgap to the decline in merchandise stocks on other lines and the public became conscious of light conditioning.

Strongest effort was reported in the San Francisco, East Bay, Fresno and Stockton territories where the units of the Appliance Society put additional pep into the campaign by added stimulants and special campaign efforts.

In San Francisco the Appliance Society unit focused interest of dealers and salesmen by conducting a window display contest and a sweetpstakes drawing for 7 prizes among dealer lamp salespeople.

In the window contest, 30 dealers installed window displays, 24 were competing in the contest and first prize of $25 was won by Sterling Furniture Co, second prize by Nathan Dohrmann Co., and third prize by the Emporium. In the salesmen's sweepstakes, in which each sale was good for one opportunity to draw a prize, the winners of defense bonds and cash in the order of drawing were as follows: Betty Hamilton, Hale Bros., Market St. store; Leon Samuels, Lachmann Bros.; Lloyd Rea, Sterling Furniture Co.; Dave Friedman, Union Furniture Co.; R. P. Lilienthal, Chas. Brown & Sons; Allen Cummings, Sterling Furniture Co., and Stella Popavich, S. H. Kress Co. Prizes were provided from a fund donated by the San Francisco unit of the Appliance Society, General Electric Co., Lamp Department, and Westinghouse Lamp Division.

At Oakland, the outgrowth of the campaign has been the establishment of sales training schools among department store and dealer sales people to improve their ability to sell correct lighting equipment. Near the end of the campaign, on Sept. 22, at P.G. & E. auditorium, Oakland, 62 salespeople, of which 28 were retail clerks, attended the meeting addressed by Clark Baker, lighting counsellor, Northern California Electrical Bureau, and Cliff Walk of Westinghouse Lamp Dept., under sponsorship of the Lighting Committee of the East Bay Unit, Electric Appliance Society. As a result, a lighting school for retail clerks is to be held in the near future. Twenty-one clerks signi-

Stopped shoppers and sold lamps, did this first prize winning window of Sterling Furniture Co., in San Francisco

fied their intention of attending such a course.

All stores in the East Bay which carried on a lighting equipment sale during the period reported exceptionally good business. Many reported sell-outs of home lighting equipment and IES lamps. One store reported as high as 140% increase in business during the campaign.

Reports from Stockton and Fresno also indicate increased activity on light conditioning and home lighting equipment. In Fresno, schools for retail salespeople were being held with the appliance counsellors of the Society in charge. Additional advertising by dealers was noted in all divisions as a follow-up of the Society's major ad. Newspaper mats and reader copy and window display promotion material were also furnished.

Although a separate activity, a series of meetings conducted by the Retail Furniture Assn. coincided very nicely with the general campaign. Clark Baker, lighting counsellor for the Northern California Electrical Bureau, conducted a series of retail clerk's meetings in northern and central California as follows: first meeting was held at Sonoma, Oct. 13; Stockton, Oct. 14; Sacramento, Oct. 15; Oroville, Oct. 16. Skipping a week, the next meeting was San Francisco the 24th; Merced the 27th; Fresno, 28th; Visalia, 29th; Bakersfield the 30th, and Oakland, Nov. 5th; Santa Barbara will be Nov. 10th; San Luis Obispo, Nov. 11th; Salinas the 12th, and San Jose the 13th.

RMEL Light Conscious

Undaunted by the war the Rocky Mountain Electrical League will stage its annual pre-Christmas Electrical Exposition, Nov. 27-29.

This announcement by G. B. Buck, RMEL president, after a meeting, Oct. 6, in Denver, with fellow executives and members of the local chapter, served notice that Mountain States electrical dealers, distributors, manufacturers and utilities will continue to hold the hard-won Christmas market, acquired by intensive promotional efforts each year. Starting in 1934, when business was bad, League expositions in Denver and a score of other communities, directed the public's Christmas dollars into electrical channels through glamorous stage shows presented as entertainment attractions in the midst of alluring electrical exhibits.

It would be a mistake, Buck urged, to abandon the Christmas market at this time, because some dealers feared priorities would deprive them of merchandise for December delivery. Dealers have stocks on hand, Buck asserted, if they have bought intelligently; and if 1942 models are not available for the Yule trade, now is a good time to dust off merchandise on the shelves and put it into circulation. The present, he added, is an excellent time to put emphasis on repairs and service. The electrical industry, in his opinion, is on the threshold of a new selling era and should capitalize every opportunity to prepare for the postwar merchandising era when public acceptance of electrical goods will be vital as an outlet for power surplusses.

Enthused by Buck's vigorous optimism, the Denver RMEL chapter not only voted to prosecute the pre-Yule activities in a bigger and better way,but outlined a 20-point program designed to keep many committees busy for the next year. The schedule includes:

(1) Street and highway lighting. (A good selling job here will be in the public interest and provide a market for power when released from defense.)

(2) Kitchen modernization. (No let-up in the intensive promotional activities now under way.)

(3) Fluorescent lighting. (It is still in a pioneering stage of development and offers an enormous frontier.)

(4) Table and household appliances. (A quick market enjoying public acceptance.)

(5) Better Light-Better Sight. (A field only partly explored.)

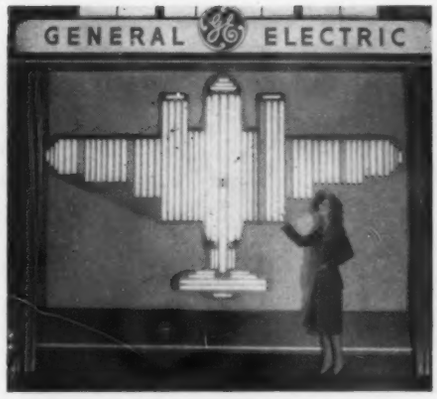
(6) Adequate wiring. (The "bottleneck" through which an enormous volume of sales must be poured.)

(7) School lighting program. (This phase is distinct from Better Light-Better Sight, and calls for a new organizational setup concentrating on this one promotion.)

(8) Illumination of house numbers. (Denver is now in process of re-identifying its streets and avenues with new signs; the next step will be to light the numbers on houses so that visitors, having found the proper street, will be able to discover the residence.)

A policy committee was established, personnel to be selected later, for the purpose of designating where RMEL shall stand on numerous issues now confronting the organization, and crystallizing membership attitude.

George E. Lewis, League manager, was authorized to proceed with an outdoor Christmas lighting program, involving contests in 6 Rocky Mountain region states, which will immediately follow the pre-Christmas electrical expositions in Colorado, Wyoming, New Mexico, South Dakota, Nebraska and Eastern Montana.



Climax of each show—Miss Fluorescent aglow from 74 lamps

"All-Out Fluorescent"

"All Out" is the trend of the times and "All Out" it was for fluorescent lighting in a series of meetings being held by three crews from the General Electric Co.'s lamp department of Nela Park. The western troup held meetings Oct. 16 at Salt Lake's Hotel Utah; Oct. 21, Los Angeles' Mayan Theatre; Oct. 23, San Francisco's Scottish Rite Auditorium; Oct. 27, Portland's Multnomah; Oct. 29, Seattle's New Washington, and Oct. 31, Spokane's Davenport.

Attending the meetings were the distributors, fixture dealers and manufacturers, large lamp dealers, electrical contractors and utility people interested in fluorescent lamps. The program highlighted every phase of fluorescent lighting for defense industry, commerce and the home. It contained spectacular demonstrations, black light effects, dramatic skits and climaxed with the crowning in each case of a local "Miss Fluorescent" while she stood before a model of a U.S. Army bombing plane aglow with 74 types and colors of G-E Mazda fluorescent lamps.

The far western troup was headed by C. O. Brandel, sales dept., and included C. E. Weitz, consulting engineer, who had just completed a tour of meetings with the Pacific Coast Electrical Assn.; and Arthur Loewe, coordinator of F lamp manufacturer and fixture makers.

The sales angles and the market potentialities for F lamps, switches, starters, and ballasts were made the purpose of the program.

● A "SAFETY WITH LIGHT" program featuring a series of instructive cartoons, to be run in local newspapers, has been developed by the U. S. Junior Chamber of Commerce. The Junior Chamber cartoons are sent to newspapers in mat form, and each of the series presents safety hints for night driving.

Government defense housing trailer camp at San Diego fed by an underground distribution system to service centers on posts between trailers.

Defense Housing Speeded

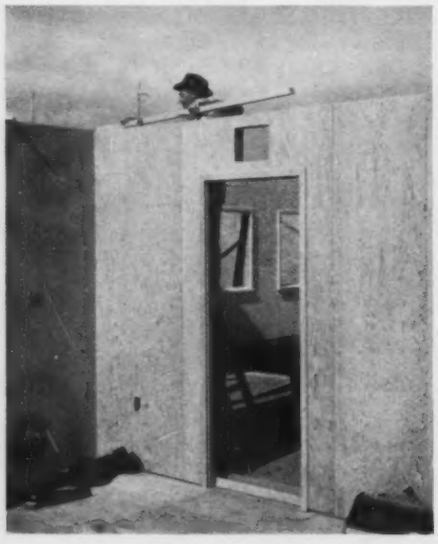
Knockdown dormitory buildings developed whose electrical installation standards are kept high

By Scott Beamer

Associate Electrical Engineer, USDA, FSA
San Francisco

ORDINARILY the Farm Security Administration of the Department of Agriculture is thought of in respect to one function of its program, the construction of farm workers' camps throughout the Pacific States. As might be expected, however, upon the arrival of the present emergency, a certain portion was allotted to this particularly well qualified organization.

Orders were given for 100-men, portable, single style dormitories, in the region of the Mare Island shipyards, as one typical example. These dormitories were not to exceed in price $23,000 including utilities. The architects were busy for a week and the result was a two-story, panel structure of plywood and nails, 10 x 12-ft. rooms and long narrow halls. These buildings were situated near Vallejo city limits.



The interior wiring brought very clear cut requirements: (1) safety, (2) a portable wiring system, and (3) an added note of cheerfulness to offset the confining effect of these buildings.

Probably as a result of the strenuous efforts for an adequate wiring and lighting program, the district engineer, H. P. Halsteen, and Nicholas Cirino, regional engineer, gave instructions for a first class lighting and wiring job of adequate capacity, and approved the layout for protective floodlighting also.

The utility engineers, consisting of the writer, assisted by Burtram J. Friggs, assistant electrical engineer and K. George Ono, junior electrical engineer, had four days in which to design the water, water heating, gas, gas heating, sewer and electrical systems—all to be coordinated into a portable building, put together like a Chinese puzzle, and secured with double headed nails. It is hard to imagine erecting buildings 140 ft. long and 28 ft. wide with all of their component parts, structures that can be taken apart piece by piece, packed onto trucks and moved inland or to any other desired location. When the electrical work was done it was an electric metalic tubing job, completely portable so that even the pipe straps were set down with double headed nails, and still it complied fully with the National Electric and the Vallejo city codes.

The greatest hardship for the electrical contractor, Robert P. Case, Napa, was that he was required by the specifications to make every outlet and switch box absolutely flush with the potentially inflammable plywood walls.

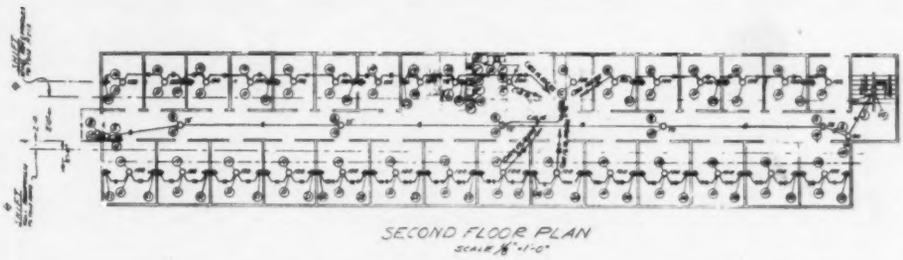
Each room is individually lighted by single 100-watt Vision-aid indirect, silver bowl fixture and has two convenience outlets—one for the streamlined bakelite bedlight and the other for the portable radio and possibly the electric clock sitting across the small room on the wardrobe.

Imagine the difference between this

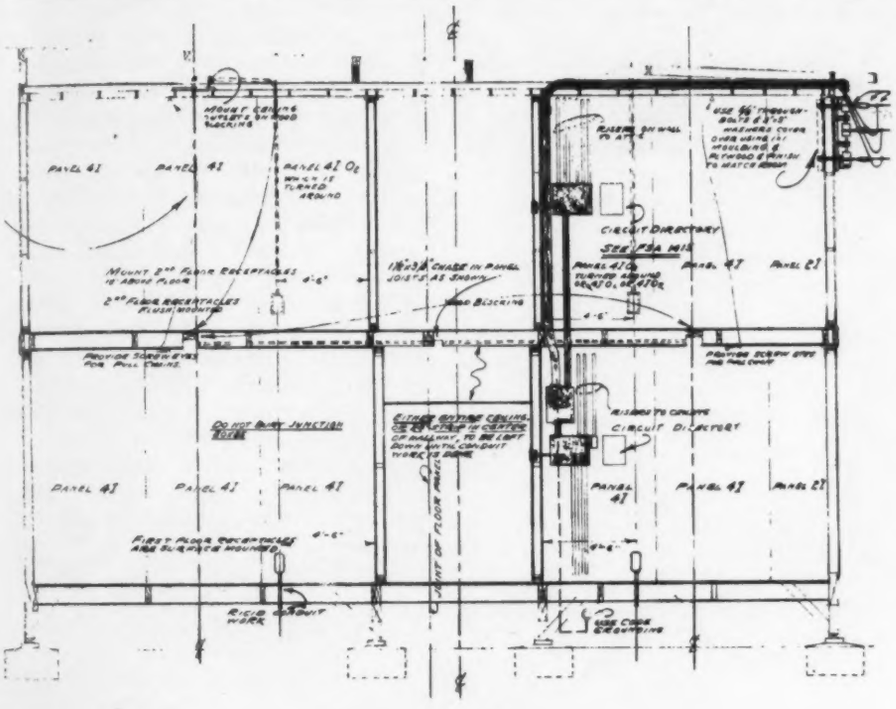
Wall sections of plywood in which the conduit and outlet boxes were already installed, were assembled as shown at the left. Note the conduit stubbed up above the ceiling line. At right the ceiling outlet and feeder runs being installed. Near the center of the picture can be seen the conduit stub to which a pull box has been set. On the facing page are two drawings, one a cross-section view of the dormitory construction, showing the main service, circuit breaker panel and distribution panels, and conduit runs to outlets. The plan indicates the number of outlets installed on a floor

type of installation and a single porcelain outlet protruding from the surface of a side wall stuffed with a double or triple socket and extension cords strung hither and yon. This is where the electrical work added the necessary note of refinement and cheerfulness.

For safety it was necessary to follow one section of the Vallejo city code requiring a separate emergency hall lighting circuit which keeps the halls and the exits at both ends burning all the time.



SECOND FLOOR PLAN



GENERAL CROSS SECTION
SHOWING ELECTRICAL DETAILS

The electrical work of this caliber ran 5% of the total cost of the building, but the requirements were met for the necessary safety, cheerfulness and a foolproof portable system. Competent outside electrical engineers and private utility engineers have told the FSA that they like the highway safety and protective floodlighting, the large feeder cables to offset voltage drop and the large number of outlets, 250 per building.

Methods of Contracting

Not all contractors prove to be chiselers nor do all government inspectors prove to be bull-headed arm chair engineers who do not know what they are trying to do. This was written to show how one government organization overcomes certain of the difficulties now being experienced in defense wiring.

To protect public funds the Farm Security Administration endeavors to make electrical designs which are really complete. The specifications are simple, call for items by manufacturer's name and catalog number, but still are very binding. This organization works closely with the electrical subcontractors, follows details, inspects constantly and comes out with good jobs.

Considering each in turn, here's how:

By complete designs the FSA means showing details of the close corners, power company's connections and metering facilities, even to boiler control wiring diagrams. To make sure that the pole line work has sufficient detail a large sheet showing all probable pole structures is included in each set of plans. Every nut and bolt is shown.

The specifications are broken down into four parts: interior wiring materials and pole line materials, followed by interior and exterior workmanship. As heretofore mentioned the materials are called for by the manufacturer's name and catalog number or equal. The workmanship requirements point out specific details, such as mounting of outlet boxes, wiring methods with lock nuts and bushings, soldering, taping, splicing and even unto compliance with the National Electric Code and codes covering overhead construction.

The bottleneck of difficulties, frictions and violations has really been smashed by calling in the electrical contractor and his construction superintendent in person to meet with the designers and thoroughly going over with them practically every detail of the plans and specifications. At this time the contractor can present ideas and suggestions brought forth by his experience and give any recommendations for changes in these plans and in plans to come. The designers can explain to the contractors why certain things are being done just as they are and rub out a great deal of the undue prejudice of the contractor toward the designer and the design of the job. It seems that when the contractor can really put in his nickel's worth and get express permission from the designer direct for making little changes, he will take a heartfelt interest in the job and do a much better piece of work than he otherwise would.

Does it not seem better that all of us with electrical engineering experience should coordinate our efforts to complete this defense work; not stand at sword's point working against each other? The Farm Security Administration has also experimented with another practice—that of comparing estimates of the electrical jobs after the contracts have been awarded. This creates a tremendous amount of interest with the men in the office and field and helps them both to become far better acquainted with the jobs as a summation of its component parts. From here on the FSA carries the work through by sending its several designers out into the field during construction to collaborate with the contract engineer on the job and assist in complete inspection as the job is in progress, once again drawing upon the interest of all concerned on the job. This not only helps the contractor to keep from repeating mistakes on a job, but helps the designer know how to put such design

details on a drafting board so that they go into the plans in a more effective manner.

This entire policy is probably the result of the fact that the FSA electrical engineer had himself worked with an electrical contracting firm and appreciated their difficulties as well as their shortcomings and realized that it is better to get in and be on the job with them than to fight it out against them.

Moreover we bend every effort to see that standards of workmanship are maintained high despite labor scarcity, and random substitution of materials is not permitted even if hard to get.

Black Heat Speeds Clay Screen

By Don Atkinson

General Manager, Atkinson Brick Co.
Los Angeles

IN the manufacture of brick one of the important factors limiting production is the tendency of clay which has a small moisture content to adhere to the screens through which it it being sifted, thus clogging the screens and requiring constant attention and cleaning of the screens. Not only does this clogging retard production but the frequent beating of the screen to clean it is destructive to the screen and a considerable item of maintenance cost. So serious was this difficulty with the Atkinson Brick Company of Los Angeles that we resolved to find an answer to the problem. Believing that electricity offered possibilities, we enlisted the services of the Quality Electric Co., Ltd., Los Angeles, which worked out a very satisfactory solution.

From measurement of the resistance of the iron wire screen and a calculation of the amount of heat required to evaporate the moisture it was determined that a 25-kva air cooled transformer with 440-volt primary and with secondary to give from 1 800 to 3,000 amp., using the screen itself as the heater, would be ample for the job. Such a transformer was designed, built and installed by Quality Electric at the Atkinson plant.

The accompanying illustration shows the arrangement of the screens, location of the electrical equipment and a very marked contrast between the condition of the clean lower screen electrically heated and the upper screen which is not only about 30% clogged with damp clay but also shows the effects of beating to remove the clay. The upper screen, which is a shaker, is set at an angle of about 65 deg. while the lower vibrating screen is at about a 45 deg. angle. The absolutely clean appearance of the lower screen denotes the success of the application. This screen is 3 x 8 ft. and with normal moisture content in the clay requires 18 kw. for perfect operation. There are two such screens, each supplied with its own transformer. The transformer secondaries are connected to the screens through extra flexible leads attached to either end of the screens by 1 x 3-in. copper buses. The screens operate at black heat.

To get at the actual financial results of this unique development the following figures are of interest. Before the installation of the electric method from four to five new screens per month were required, these costing $7.00 each. This together with the labor cost for changing averaged $1000.00 per year. The high mortality in screens was due to the necessity for frequent beating. In addition to the screen cost an attendant was necessary at a cost of $1,560.00 per year. The electric method has been in operation three months and from present indications a screen will last at least one season, which is from rainy season to rainy season, and the need for the attendant has been eliminated, these savings amounting to $2,560.00 per year.

In addition, production has been increased 15%, or from 95,000 bricks per day to 109,000 with no additional force. Prior to making the change the extrusion machine and other equipment following the screening process had greater capacity than the screens could supply and after the introduction of the electric method it became necessary to speed up these machines 11% to keep up with the increased screening.

Needless to say, we are extremely well pleased with the installation and find it to be the best investment ever made in the plant.

Clogged upper screen at left is typical of such screens. It also shows the effects of beating to remove clogs of wet clay. Lower screen is the electrically heated one, clean and in perfect condition. At the right is the special 25kva transformer and secondary bus connections. Primary wiring was temporary when this picture was taken. The screen itself acts as the electric resistor

More Mercury

Denver's highway lighting program, already advanced to a notable stage, took on new impetus last month when George E. Cranmer, manager of parks and improvements, announced plans for immediate completion of safety lighting on Colfax avenue and Broadway. This will provide superlative night illumination on the city's main traffic arteries from east to west (Colfax) and from north to south (Broadway) to the county boundaries.

Dana W. Rowten, Public Service Co. of Colorado illuminating engineer, and Murray Graff, General Electric Co., who recently finished an exhaustive survey of Denver's streets with the G-E Lighing Evaluator, which appraises motor traffic in its relationship to safe illumination, will supervise the big job and believe it will be installed before Jan. 1, 1942. Deliveries of equipment have been promised before that date.

Luminaires containing a 16,000 lumen mercury-vapor lamp, and two 1,000 lumen incandescents, will be used on 25-foot standards most of the distance, with sodium units substituted for mercury on viaducts connecting downtown areas with north and west Denver. The same type of equipment, of similar intensity, is now in operation in the city's business district.

It Could be Worse

Priorities haven't hurt yet but will; other headaches for contractors appear

AS of Oct. 30 nobody had yet been hurt too badly although the crying towel had been wrung out once or twice just in anticipation of what things may come to. The house building boom had been hauled up short, but largely in fear of shortages that as yet have not developed except in some items. Commercial building modernization and alterations have likewise stopped, more from a patriotic idea of saving materials than actual necessity as yet. Wholesalers' stocks were ample in most items except wire, very short on some fast moving items like switch and outlet boxes of the most common types, but not on others.

That, in a paragraph, sums up the much discussed and heavily cussed priority situation in the wiring field. The clouds that appear on the horizon look much blacker, however, for the next few months. A concise summary of several important aspects is worthwhile.

Materials

Well informed sources indicate that there is a heavy inventory, almost too heavy merely to offset slow deliveries, of most wiring construction material. Manufacturers' stocks are low, but wholesalers' are strong. Galvanized conduit is still available except in some large sizes. A little enameled thin-wall conduit has appeared. Few if any jobs have been unable to secure needed material, sometimes not from one jobber, but another.

Wire is another story. Stocks are low in No. 6 and No. 4 and colored wire to comply with code requirements is sometimes hard to find. Inspection departments are inclined to help work out with contractors' substitution of other types of equipment still available without reducing safety standards but they resent attempts to palm off materials of doubtful standard under the excuse of "defense" or "not available."

Defense Housing

Late in September priority control was instituted on materials for residential building. Many people interpreted the publicity given as meaning it was against the law to build a new house unless it could be classed as for defense. This stopped house building drastically. Now a few private homes are being attempted again from materials available.

To class as defense housing, houses must be approved by the defense housing coordinator (at former FHA offices), must be within commuting distance of a prescribed defense area (lists on file), cost not more than $6,000 with lot, rent for less than $50. A prescribed list of materials may be given a priority number; wiring system will be designated (knob and tube for nonfireproof construction usually). A limited number of housing units has been designated for each area.

The new Supply Priorities and Allocations Board, accordnig to Washington dispatch, will control all construction, public and private, power company, REA, state and federal river, harbor, flood control, utility. Utilities were already under OPM. REA is likely to be curtailed further. Public power projects aren't likely to have the brakes applied though.

Wage-Hour "Hot Goods"

Two new worries face contractors. A sort of "secondary boycott" can now tie up shipments of "hot goods" across state lines. "Hot goods" are those produced by anyone in violation of the wage-hour law. The user or contractor may himself pay the required wages and comply as to hours, but now he can be made a party to the violation of the manufacturers unless he can show he has paid sufficient to insure the maker to pay fair wages, etc. Or he may stipulate in his contract that the supplier will meet the requirements, keep records of it, etc. The user is now called on to police the manufacturer or be liable for violation himself.

Draftees Return to Jobs

Contractors will have a problem unique to their own type of off-and-on business when draftees are released and sent home to get their old jobs back. They are to have like seniority, status and pay to that they left. If the contractor can't employ them they can collect unemployment benefits chargeable to him; so can the employee taken on in his stead if he is discharged. Future unemployment tax rates will undoubtedly reflect this drain. With a drop-off in construction a contractor's chances to reemploy men will be materially reduced.

Subcontracting Defense Production

Although an attempt has been made in San Jose and one or two other West Coast cities to set up a local cooperative organization of manufacturing facilities to take on a big defense production contract and divide the job among local firms, this program so far holds little prospect for electrical contractors. Primarily the plan is one for manufacturing.

To date no serious attempt has been made by any group of contractors to form a new syndicate to take on a large defense construction project. The electrical work for such projects, where released for subcontract, has been taken by a few large operators.

Altogether the outlook for the majority of electrical contracting firms is not rosy. It is apt to be much worse before it gets better. An effort is being made in Washington to plan some sort of a relief program for such small businesses as contracting. It is to be hoped the rescue party will arrive in time.

Saint Bernard dogs with a brandy keg on their collars would help a lot if small business freezes much more.

McGraw Awards

Robert W. McChesney, vice president of Harry Alexander, Inc., Washington, D. C., and president of the National Electrical Contractors Assn., was given the McGraw Award at the NECA convention in Houston, Oct. 8. The citation stated he was given the award "in recognition of his contribution to the advancement of the contracting branch of the electrical industry through his personal effort and industry leadership in preventing the absorption of electrical construction by general contractors on national defense work, by securing government endorsement for the economic functions of the specialized subcontractor."

Awards for 1941 under the James H. McGraw award for electrical men have been announced by the committees for the manufacturer's medal and the electrical contractor's medal.

Dwight C. Phelps, vice president, Colt Patent Firearms Mfg. Co., Hartford, Conn., was given the manufacturer's medal at the NEMA convention Oct. 29 "in recognition of his distinguished contribution to the advancement of the manufacturing branch of the electrical industry in the surveying of wage experience within the industry to establish a sound basis for company policy and for minimum wage control under the Walsh-Healy law."

LIGHT

for a SKATING RINK

Incandescent

Who

Imperial Skating Rink, 419 S.E. Madison, Portland.

Conditions

Space 100 x 200 ft., 12 ft. ceiling. Latticed ceiling to cover rafters. Painted off-white.

Installed

On 22 x 25 ft. spacing reflection shields were installed above the lattice, at center of each a 300-watt Curtis Edge-ray unit. Total wattage 10.8 kw.; .54 watts per sq. ft. Six footcandles after a year's operation. 150% increase over replaced bare lamp and shades.

for a RESTAURANT

Fluorescent

Who

Heathman Hotel Coffee Shop, Portland.

Conditions

Room 25 x 40 ft., 11 ft. ceiling.

Installed

Coves with 45 40-watt white F lamps in troughing, plus 21 200-watt downlights on 7-ft. spacing. Total 6.5 kw., or 4.6 watts per sq. ft. Illumination on tables 25 fc.

for a NIGHT CLUB

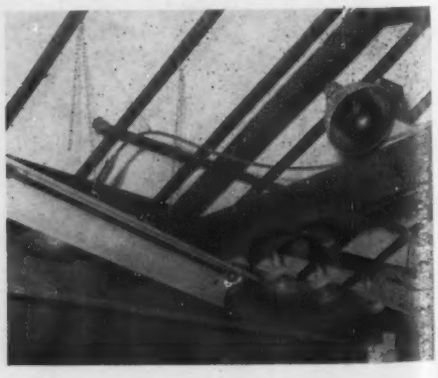
Ultra-Violet

Who

Jack and Jills, outside of Portland.

Installed

Over 25 x 25 ft. area of dance floor devoted to floor shows, 6 Unico General Electric mercury vapor lamps with filter glass tubing, three on each side; and 6 250-watt H-5 mercury lamps in reflectors. For general lighting 36 200-watt S&M floodlamps with red and amber color screens.



EMEA *Dope Sheet* — *Edited by Howard C. Park*
EMEA of So. Calif.

Brushes—Their Selection and Care

Part I of a concise summary of what to look for and expect from motor brushes

The subject of commutation is considered by many engineers to be one of the most intricate in the science of electrical engineering. The proper performance of the brushes is an essential part of the process of commutation.

Function of Brushes

Brushes have three distinct functions to perform in the process of commutation.

1. They must carry the load current to and from the rotating contacts of the machine —the commutator.
2. They must resist destructive action from the voltage induced in imperfectly compensated armature coils undergoing commutation.
3. They must be of sufficiently good quality bearing material to maintain contact with the commutator at the required speed of operation to which they may be applied, which may be as great as seventy miles per hour.

Satisfactory Brush Performance

While opinions may differ as to what constitutes satisfactory brush performance, the following can be considered as essential elements of satisfactory operation and their fullest attainment should be sought.

1. Freedom from injurious sparking.
2. Negligible commutator wear.
3. Uniform gloss over commutator surface.
4. Minimum electrical and mechanical losses.
5. Quietness of operation.
6. Good brush life.

Installation and Maintenance of Brushes

The essential elements of satisfactory brush operation can be controlled, to a great degree; (a) by careful installation, (b) proper maintenance and (c) use of correct quality brushes.

Type and Quality of Brush

Since there is no "universal brush" that will give satisfactory performance under all conditions, the selection of the brush should be given very careful consideration.

The type of machine, operation and local conditions will largely determine the type and quality of brush to be selected.

In general, a brush should be able to produce satisfactory electrical wear, maintain good commutator film and possess good commutation factor capable of withstanding excessive mechanical wear.

Usually the reommendations of the manufacturer of the machine on which the brush is to be used, or a reputable brush manufacturer may be relied on in the selection of the proper quality brush.

Should the brush selected not give satisfactory performance, it may be possible that some one or more other factors affecting proper brush performance are the fault rather than the quality of the brush.

Brushes may be frequently referred to as soft or hard, abrasive or non-abrasive. The general classifications are as follows:

1. Soft graphite grades.
2. Firmly bonded graphite grades.
3. Carbon and carbon graphite.
4. Electrographitic.
5. Traction service brushes.
6. Metal graphite. (Slip ring service.)

All the brushes of any one brush assembly should be of the same grade and quality.

Brush Holders

Brushes should be free to move in brush holders without causing excessive friction, but not free enough to permit tipping and thereby disrupt the contact with the commutator. Brushes should have a minimum clearance of .002″ and maximum of .009″.

For the best support of the brushes the clearance of the brush holder from the commutator should not exceed 1/8″ to 3/16″.

The angular position of all holders of a brush assembly should be uniform with respect to the commutator.

Holders designed for trailing position give the best performance at an inclination of 15°—25°; for leading position of 30°—37.5°.

Brush Spacing

Equal spacing of brushes around the commutator is a factor of major importance in obtaining satisfactory brush performance.

If the spacing is not uniform, circulating currents flow between brush studs of like polarity due to the difference in potential, on generators; or difference in counter emf. on motors. These circulating currents may be high enough to cause serious heating of the armature windings and excessive current density in the brushes. Under such a condition it would be impossible to adjust all brushes to the best commutating position.

Spacing of the brushes should not be accomplished by tilting the brush holders on the supporting arm, as this will destroy the symmetry of brush pitch and may produce improper spacing between brush holder and commutator surface.

Brush Alignment

Brushes should be accurately aligned, parallel with the commutator segments.

Improper alignment will increase the over-all span of brush contact on the commutator, dirupting proper commutation by prolonging the commutating interval. Under such a condition it may be impossible to find a position at which brushes will operate without sparking.

Staggering Brushes

When the brush assembly consists of more than one brush per arm, the brushes should be so adjusted that the brushes of like polarity extend over the length of commutator and in such an arrangement that the commutator surface is contacted equally by brushes of each polarity.

The surface film deposited by the positive brush is not the same in appearance or structure as that deposited by the negative brush. Staggering the brushes will not only improve the appearance of the commutator but has certain advantages in respect to performances.

Brush Seating

Since the process of proper commutation depends on the short-circuiting of the coils under commutation by the brushes, it may be said that the intimacy of contact between the brushes and the commutator is one of the most important factors of commutation.

Brushes should be formed or seated so as to provide maximum surface contact with the commutator over the entire face of the brush.

Imperfect contact at the brush face aggravates the tendency for unequal electrical distribution between brushes of like polarity and reduces the short-circuiting function of brushes of unlike polarity.

It is generally considered best practice to seat brushes in the brush holder in which they are to be used. This may be done by either the use of the proper grade of sand paper or brush seating stone, the grade used depending on the mechanical density of the brush.

ELECTRICAL WEST

McGRAW-HILL COMPANY OF CALIFORNIA
68 POST ST. SAN FRANCISCO

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Tribute to Engineers

MUCH water has run under bridges and over dams on the Columbia River since the Grand Coulee dam was begun back in 1934 as a work relief project. In this issue is a pictorial insert commemorating the initial operation of first 108,000-kw. generating unit in the Coulee power plant. In the interval between start and completion there have been a lot of changes. The original irrigation concept of project has been laid away in moth balls "for the duration." Emphasis has been placed on power to the exclusion of everything else, largely because of the public power policy of the present administration and now because of the defense program.

There have been plenty of fulminations from power men over the politico-economic aspects of the project. However, regardless of the views of anyone with respect to these aspects, all can join in a sincere tribute to the engineers and workmen who built the great dam and its apurtenant works. The U.S. Reclamation Bureau engineers were given a job to do—design and build a structure to accomplish certain purposes. They did it and did it well. To them and the thousands of workmen who built so well, then, is due a real salute for accomplishment in the face of hitherto unencountered obstacles and engineering problems. The job they did is a credit to engineering and construction.

Time for Patience

IN SOME of the remoter areas where the full impact of the defense program is not yet appreciated, there are contractors, utility men and dealers who are seeking answers to a lot of questions about priorities, material shortages and long deliveries. They are inclined to blame the manufacturers and suppliers for conditions over which these people have little or no control.

They want answers to such questions as these: Why haven't we received the material, equipment or appliances we ordered last month? What is all this priority stuff anyway? Aren't favored customers getting the breaks? What's the reason for deliveries that run as long as six months ahead?

The situation is one requiring patience and understanding. There *are* favored customers for a lot of materials—the Army, Navy and recipients of Lend-Lease aid. Their demands are making curtailment of civilian requirements more and more strict. Deliveries on some materials will get longer before they get better. For instance the use of copper for all civilian uses except as a conductor of electricity is out.

These are some of the things that people in the non-defense areas must appreciate and reckon with. The pinch is going to become tighter. That means more improvisation, more rehabilitation, more and better servicing of existing equipment. It means, above all, the exercise of extreme patience. Otherwise the prime defense job won't be done.

Missing the Fluorescent Boat

A LOT of people are saying that the electrical contractor "has missed the boat" on flourescent lighting. They point to the so-called "new" people who are entering this field and charge that unless the contractor moves quickly, this great and potentially profitable market will be lost to him. Surveys are cited to show that this is happening.

Maybe so. But if the contractor is missing the boat, could it be that he doesn't think the ride would be either pleasant or prosperous? Maybe he doesn't like the looks of his would-be shipmates. There must be reasons for his seeming lack of interest.

Here are some of them: Many contractors have inherited all of the grief from some of the early fluorescent installations. And those familiar with this development will admit that there has been grief, particularly from recurring service calls. Others have honestly and diligently tried to engineer and sell jobs that were in accordance with the high standards suggested and the definite advantages of this new light source. They have seen some of the "new" factors in the business come forward

and underbid them on inferior installations which the customer has purchased. In most cases the contractor is called in later when the jobs go sour and is asked to make amends. There are not many contractors who will honestly assert that they have made money from fluorescent lighting—yet.

As quickly as stability, standardization, sound salesmanship and ethics are put back of fluorescent lighting sales, the contractor will be attracted to this promising field. The attempts of many power companies to bring about orderly development of this new source is encouraging more contractors to become active. As one contractor recently put it, "We're not going to miss the boat on anything that is electrical or profitable. Don't count us out."

Keeping On

IN SPITE of increased sales taxes, restricted terms and merchandise shortages, "After giving this problem much consideration," says San Diego Gas & Electric Company's report to stockholders, "the company has decided to continue without curtailment its load building efforts. That it is *unwise to let the public forget the advantages and conveniences of electricity* and gas, even in the face of curtailed production and consequent shortage of appliances, was established in 1916-17. The company is therefore participating in the ninth annual Christmas Electrical Exposition to be held in Balboa Park, San Diego, during the last week in November, and it is interesting to note that the majority of former exhibitors are following a similar policy."

It is heartening to the entire industry at a time like this to hear such a pronouncement from an important utility leader. Similar hope and strength was given the Rocky Mountain region when the executives of Public Service Co. of Colorado declared that, if anything, next year's personnel and program would be increased, not curtailed, its advertising attuned to the long pull of business to be done after the emergency.

To keep business in business, to preserve the American way of life, business itself must show the courage and the determination to survive.

Shift to Light Conditioning

WHEN priorities and curtailment of production of appliances threw the merchandising balance all out of kilter, fortunately there was light conditioning to come, like the Marines, to the rescue. Almost unanimously the utilities shifted their usual appliance promotional efforts to an all-out program on light conditioning.

Light conditioning, using less materials, bringing such immediate and noticeable customer benefit at so little cost, has proved an ideal shift for the industry to make in this state of emergency.

Defense Contracting

ONE of life's disappointments is that those who deserve to receive work, because of price competition, do not receive it, and those who do receive it because of price sometimes disgrace their industry by the evasions they attempt, the substitutions and lowered workmanship they try to get away with.

Government construction standards are high because maintenance, in time of emergency, must not become an added burden on a defense effort that needs all the manpower available.

"Surely you would think just the patriotism of a man would keep him from cheapening and weakening the job," said one government designer.

Surely too, if contractors wish to keep receiving a portion of the job that came near being absorbed by the general contractor, they should exert every influence to turn out a superior job for the nation, not take a chiseling chance and lose everything.

ANY EXTREME pessimism over the future of the appliance business, particularly during the period of our national emergency, is unwarranted. No one is bent upon the destruction of business. On the contrary, we may expect that every possible constructive effort will be exerted, consistent with vital defense necessities, to support our internal strength, the national economy and every essential part of it. This policy is, in fact, imperative and indispensable to national defense itself. As the momentum of the defense program accelerates we shall, of course, feel the pinch of priorities. Our resourcefulness may be tested to the limit but the results will not be and must not be fatal. To believe otherwise is to assume the failure of the whole patriotic program, which is unthinkable. Wars always accelerate and crystalize developments which normally require many years. Out of this one will ultimately come a better civilization, improved national and international relations, greater hope and security and better business. New methods, products and processes will appear. They will be the natural results of intensive effort, courage, faith in the future and the determination to defend and preserve our way of life.—H. L. Andrews, vice-president, General Electric Co.

PCEA *Panorama* — *Edited by Mary Shoop*

Speakers at Watsonville meeting were: A. E. Strong, Coast Counties Gas and Electric Co.; W. M. Ryales, Stone-Ryales Electric and Mfg. Co.; F. C. Angle, S.F. Dist. Mgr., Allis-Chalmers Mfg. Co.; C. E. Weitz, General Electric Co., Lamp Dept., Cleveland; V. W. Hartley, Mng. Director of PCEA; G. C. Tenney, PCEA President

District Meeting Series Success

Review of present day industry conditions; forum on member questions are highlights of gatherings

PRONOUNCED by many members the most interesting ever held, the annual series of PCEA district meetings closed Oct. 17 after covering the length of California and extending into Nevada. Total attendance reached 2,723, which compares favorably with last year's figure of 2,732 for 15 meetings. This year there were 14. The following figures show the large attendance at each meeting:

Reno, 175; Chico, 180; Sonoma, 136; Sacramento, 273; San Jose, 207; Watsonville, 190; Fresno, 233; Bakersfield, 175; Santa Barbara, 165; Santa Ana, 158; San Diego, 255; Alhambra, 285; Santa Monica, 102; San Bernardino, 189.

Pleasantly varied in tempo and subject, each program presented a splendid review of present day industry conditions by PCEA President George C. Tenney, who was represented at the Bakersfield and Santa Barbara meetings by R. G. Kenyon. A talk on fluorescent lighting was given by C. E. Weitz, G-E lamp department engineer, Nela Park.

A highlight of each meeting was the quiz at which a forum board, including a prominent manufacturer, wholesaler, contractor and utility company representative, answered questions which had been submitted previously by members present. This feature proved so interesting and successful that consideration is being given to including it on the program of next year's district meetings.

PCEA President George C. Tenney in roles of "industry newscaster"

A COMPLETE report of the joint fall conclave of PCEA, held in Fresno, Thursday and Friday, Nov. 6 and 7, will appear in next month's issue of ELECTRICAL WEST. Great interest was evidenced in the meeting, not only because it combined for the first time in several years the northern and southern conclaves into one state-wide event, but also because it was distinguished by the presence of C. E. Kellogg, president of the Edison Electric Institute, Davis DeBard, vice-president of Stone & Webster Engineering Corp., and other industry executives.

The Hotel Californian was the headquarters for the business development and administratives services conclave.

Who Am I?

I was born in Minneapolis, Minn., June 3, 1898. I was graduated from Shakopee high school in 1905, and worked for the next two years at the municipal electric plant and as plant engineer at a flour mill near Minneapolis. I received my electrical engineering degree from the University of Minnesota in 1911. I came west to spend the next year as station operator for the Portland Railway Light and Power Co. and in 1912 began a five year industrial engineering affiliation with the Southern California Edison Co. Who am I?

During the World War I was a captain of the 56th United States Engineers, First Army, A.E.F. In 1919 I served on special assignment at British G.H.Q. in London to report on the city's air defenses. Later that year I was transferred to the office of Chief of Engineers, U. S. Army, Washington, in connection with searchlight development. Who am I?

After the war I returned to Los Angeles, where I was one of the founders of the electrical manufacturing firm of Brown and Pengilly, which in 1927 became the Diamond Electrical Manufacturing Co. Three years later it merged with the Square D Co., of which I became vice-president and director. In 1937 I was appointed manager of the western division, comprising the eleven western states and Hawaii. Who am I?

I am a major of the Engineer Reserve, U. S. Army, and am assigned to war department reserve pool because of defense work in which the Square D Co. is engaged. I am president of the Los Angeles Electric Club and a director of the Pacific Coast Electrical Association. I am a member of the Shrine and a past potentate of Al Malaikah Temple, A.A.O.N. M.S. I am a member of the Jonathan Club and the Wilshire Country Club. I am married, reside in Los Angeles, and my name is:

See page 75.

Hot Wires at the Arsenal's Main Switch!

There should be a brilliant and thrilling chapter on the achievements of the electric light and power industry when the story of this defense effort comes to be written.

Here at Line Material, we see it from an unusual vantage point—close enough for sharp detail—remote enough for good perspective.

For our work is often where former capacity must suddenly be doubled or tripled overnight . . . where gigantic munitions plants must be served without delay.

We see the fight and drive and technical strategy of men who accept seemingly impossible assignments. But somehow, they manage to make delivery at the main-switches of immense new war-tool factories . . . the myriad outlets of normal industry . . . and yet maintain the usual domestic service.

Apparently, the time is yet to come when the final limit of the industry's strength and ability can be fully measured.

LM

LINE MATERIAL COMPANY

The operating economics section held a separate meeting at the Hotel Fresno.

ELECTRICAL WEST reporters covered every general assembly, joint section sessions, luncheon program and group meeting. Concise reviews in next month's issue will be of value both to members who attended and to those who were not present at the conclave.

Electriquiz

B. D. Moses of the College of Agriculture, University of California, Davis, provides this interesting true or false quiz.

1. An electric brooder is used only for chickens and other birds or fowl.
2. California has more electrified farms than any other state.
3. California farmers use more electricity than those of any other state.
4. Lights are used in poultry laying houses to increase total egg production.
5. Evaporative coolers, sometimes called "desert" or "Arizona" coolers, are best suited to the drier sections.
6. Soil heating cable is best suited to hot bed or greenhouse use.
7. An electric dairy sterilizer is used to pasteurize milk.
8. Alfalfa in the Sacramento and San Joaquin Valleys may require as much as three to four feet of water per year.
9. Ultra-violet light and infra-red rays can be produced with colored glass.

Check your answers with the correct ones on page 75.

● R. E. LAGERSTROM, division engineer of the General Electric Co., Lamp Dept., spoke to the San Francisco Section of the American Institute of Electrical Engineers, on "Cool Light—the key to High Intensity Illumination." About 100 members and guests were present to hear this talk. Lagerstrom briefly outlined the need for high intensity illumination in the modern work world to provide for quick, easy seeing with a minimum of effort. He spoke of researches which prove the necessity of high levels, even thousands of foot-candles, to make some visual tasks of the work world easy to see. Much research on both the minerals and arcs have resulted in the high efficiency fluorescent lamp as we know it today. The light from these lamps is accomplished by very little of the infra-red energy which causes discomfort. Therefore, fluorescent lighting can properly be called cool light, he said.

● NATIONAL Better Light-Better Sight Bureau, in a move for a more closely knit method of operation of the Bureau, has appointed 10 regional chairmen to support and intensify its activities. G. B. Buck, vice president and general commercial manager, Public Service Co. of Colorado, has been assigned to the region of Wyoming, Utah, Colorado, New Mexico and Arizona; R. C. McFadden, sales manager of Southern California Edison Co., has assumed this responsibility in California and Nevada; and R. B. McElroy, sales manager, The Washington Water Power Co., has been appointed for Washington, Oregon, Idaho and Montana.

Meetings

IAEI, Utah Chapter, began the first meeting of its fall and winter series Oct. 7, Utah Power & Light Auditorium. Blaine Grey, past president, Northwestern Section, gave a report on the annual convention at Tacoma, also discussed priorities. Oct. 21 meeting, J. H. Stayner, continued Code studies up to Article 320. Copy of Abbott Code handbook was given away in a drawing.

IAEI, Northern California Chapter, will hold its first fall meeting Nov. 19 at San Francisco City Hall.

* * *

IAEI, Central California Chapter, held its first meeting Oct. 7, Hotel Californian, in conjunction with PCEA regional meeting. George C. Tenney, president PCEA, spoke on "Priorities—Their Effect on the Electrical Industry."

* * *

IES, Southern California Section, met Oct. 7 to install new officers and heard Frank T. Anderson, Pacific Coast district engineer. Westinghouse Lamp Division, on "Another Year's Progress in Lighting."

IES, San Francisco Bay Cities Chapter, held its annual installation Sept. 26 at the Acme Brewery. Walter Carlson, General Electric Lamp Dept., installed as new chairman by retiring chairman Ken Knopf, Westinghouse Electric & Mfg. Co. Carlson appointed as *program* chairman Keith Noble, Pacific Electric Motor Co., Oakland; *membership*, Guy DeLeuze, Panama Lamp Co.; *educational*, John Walsh, PG and E; *publicity*, Wm. A. Cyr, ELECTRICAL WEST.

IES, Washington State Chapter, held its first meeting Oct. 1 to install the new chairman, Geo. M. Boyd, Westinghouse Electric & Mfg. Co., Seattle; secretary-treasurer, H. L. Broomall, General Electric Supply Corp.; and board members C. T. Bakeman, Clarence B. Parsons and Wm. D. Williams. Bakeman was chairman and Bert Heinz was secretary last year.

* * *

Electrical Contractors, San Mateo County Assn., held its regular monthly meeting Oct. 27 at Burlingame. Bill Klose spoke on "Home Defense."

* * *

Electric Club of Wash., Sept. 29, Wm. D. Shannon, district mgr., OPM, talked on "Priorities"; Oct. 13, H. C. Pigott spoke on "Ships of the British Navy"; Oct. 20, W. B. Little, U. S. Army District Engineer's Office, described construction of Mud Mountain Dam.

Electrical Estimators of Los Angeles decided to hold two meetings a month, on the 1st and 3rd Thursdays, at the Chamber of Commerce Bldg.

* * *

Retail Hardware Assn. of Northern California will hold its annual convention again at the Western Merchandise Mart, San Francisco, Feb. 16-18, 1942. Pot & Kettle Club of San Francisco will again sponsor a luncheon.

* * *

Air Conditioning Society of San Francisco held its monthly meeting Oct. 2. Lieut. H. M. Shannahan, U. S. Navy, spoke on "National Defense and Material Control."

* * *

Electric Club of San Francisco, Oct. 6, Chas. E. Weitz, General Electric Lamp Dept., Nela Park, subject, "Lighting—Today and Tomorrow." Oct. 13, Ralph Wiley, chief of dept. of electricity, and police chief Chas. Dullea demonstrated the new two-way FM police radio; Oct. 20, Dr. F. J. Hansgirg of Permanente Magnesium Plant, described its process.

* * *

Electric Club of Los Angeles, Sept. 29 meeting, had squadron leader R. S. Mills of the R.A.F., Oct. 6, Carlton S. Sturdy, American Can Co., "Safeguarding America's Harvest"; Oct. 13, Illuminating Engineering Society Day with Chas. E. Weitz, General Electric Lamp Dept.; Oct. 20, golf tournament was scheduled.

* * *

Electric Club, East Bay, Sept. 29 meeting, Edwin Wetmore, safety examiner, East Bay Municipal Utility District, "The District's Visual Program"; Oct. 13, Andrew Kerr, district manager OPM, spoke on priorities situation.

* * *

Electric Club of San Diego, Oct. 7, Telephone Company presented two moving pictures, "Laying Cable to Keep Up With Uncle Sam" and "What's the Technique." Oct. 14, H. A. Smith, Standard Oil Co., "The Story of the Diesel Engine."

* * *

Electric Club of San Diego moved its meeting place to the new Imperial Lounge on the 2nd floor of the San Diego Club. First meeting, Oct. 21, was entertained by a musical program of electric organ and Solovox performances presented by Thearle Music Co.

* * *

Electrical Maintenance Engineers Assn. of Southern California temporarily changed its meeting date to Oct. 22 to hear a special program on heat control and safety devices. Fred Alleman of General Controls Co. talked on "Magnetic Valves and Pilot Gas Generators." T. H. Carhill, Gensen Instrument Co., demonstrated and explained Wheelco, Flamotrol, safeguard and temperature control instruments. Glen Farr, RKO Studios, president of EMEA, presided.

* * *

Electrical Maintenance Engineers of Northern California changed its meeting place to El Jardin for its Oct. 23 meeting. B. Keating, technical research department, Shell Oil Co., at Martinez, presented a talk on "Lubricants and Lubricating Problems." W. C. James, president, handled the meeting.

* * *

Electrical League of Utah—Board of Trustees meeting to outline 1941 Christmas Lighting awards and Christmas Gift billboard advertising held Oct. 13. MKB new movie preview "It Happened in the Kitchen," presented at regular monthly industry meeting, Oct. 22. Twenty-first Anniversary party dinner-dance and elaborate floor show at the Hotel Utah. Vern Sharp, chairman. Orson John Hyde in charge of ticket sales.

NEWS of the industry

DEFENSE UPS SAN DIEGO PROGRAM TO $8,611,000

Unprecedented growth of San Diego due to defense activities is being met by an accelerated development program of San Diego Gas and Electric Co., on which $8,611,000 is being expended instead of the $6,000,000 budgeted earlier this year. Population is increasing at an indicated rate of 2,800 weekly and the military population of the community is now 40,000.

Work is being rushed on the new 35,000-kw. $4,000,000 Silvergate steam plant and, barring unforeseen delays, the station will be in operation by September, 1942. It will bring the company's system capacity up to 137,000 kw. exclusive of 55,000 kw. of interconnections with other utilities. Other major system additions include two large substations, one to be located near the new $20,000,000 Consolidated Aircraft parts plant and a second adjacent to the new steam plant. The two, with interconnecting lines, will cost $1,000,000. Upwards of 5,500 new defense housing units have been completed or are under construction, in addition to 4,279 new private dwellings built during the first eight months of 1941.

"Jurisdictional Fight" Faces PG and E East Bay Division

Strike action against Pacific Gas and Electric Co. in its East Bay division by outside workers who are members of the CIO Utility Workers Organizing Committee, is being held in abeyance pending the outcome of hearings which began Nov. 3, before the San Francisco regional director of the National Labor Relations Board. In dispute is a demand from this group that it be recognized as bargaining agent for division employees. At the same time the NLRB will hear charges by the AFL International Brotherhood of Electrical Workers that PG and E has engaged in unfair practices and has fostered a "company" union.

"What is involved here is a jurisdictional fight between three different labor organizations," said P. M. Downing, PG and E vice-president and general manager, in commenting on the dispute. "Each wants to be the exclusive bargaining representative for the employees. This controversy has been going on for four years. It began in 1937 with the Labor Board, acting on a petition filed by the CIO, designated all physical workers on the system below the rank of job foreman as the appropriate unit for collective bargaining purposes.

"The NLRB held an election to determine which organization these employees desired should represent them. The election resulted in a large majority for the California Gas and Electric Employees Union, an independent organization. On complaint by the CIO that the company had interfered with the free choice of the employees, the Labor Board refused to certify the successful organization and voided the election. It did nothing, however, toward calling another election.

"The CIO recently filed an amended petition asking that the bargaining unit be limited to the outside employees in Alameda and Contra Costa counties. Without waiting for the board to hold a hearing on this petition the CIO now demands that the company recognize it as the sole bargaining agent in this area."

Prophecy is that the petitions filed by both CIO and AFL unions are aimed at the calling of another election.

First of the 108,000-kw. generators at Grand Coulee Dam went into service on Oct. 4 and was connected to the 1,500-mile transmission network of the Bonneville Power Administration. For the complete story of Grand Coulee development turn to page 29—beginning of the special 16-page pictorial feature on this project.

● FEDERAL POWER COMMISSION has authorized the merger of facilities of the Montana-Dakota Utilities Co. with certain facilities of the Mountain States Power Co. near Baker, Plevna, and Ismay, Mont., by purchase of the latter facilities. The commission also authorized issuance by the Montana-Dakota company of an unsecured purchase money note amounting to $95,000 to the Mountain States company as the purchase price of the facilities.

● FEDERAL JUDGE LLOYD L. BLACK, of Tacoma, has set Dec. 9 as the trial date for the condemnation suits of Lewis, Thurston and Cowlitz County Public Utility Districts against the Puget Sound Power & Light Co. This is the fourth time the trial date has been postponed. The suits originally were brought individually by the counties but were consolidated for trial.

OPM REFRIGERATOR SLASH TYPIFIES FUTURE ORDERS

The recent 45 per cent slash ordered in production of mechanical household refrigerators is first of a string of limitation orders which are scheduled by OPM's Priorities Division, to encompass virtually all consumers' durable goods, including electrical appliances. The refrigerator order may be considered a "text" by which other durable goods manufacturers may anticipate what is coming. Percentage-wise, other orders will vary, but the administrative outline is to be the same.

This means that the decision has been made to limit output of end products rather than allocate specific quantities of metals to manufacturers and let individual ingenuity make the most of them. OPM's theory is thus to freeze competitive position and prevent technical talents being focused on non-defense fields. The order simply sets up production quotas; it does not extend priority assistance to manufacturers with which to obtain materials up to their production limits. It further stipulates that manufacturers must not accumulate excessive inventories of raw or semi-processed materials, finished parts or assembled units. Monthly reports of inventories must be made, together with a statement on units produced, by models, during the preceding two months.

Total of these quotas, as estimated by OPM, is 175,519 units monthly during the August-December period or 2,007,000 yearly, compared to 3,670,000 in the best period This is 43.2 per cent under the average monthly factory sales in the year ending June 30, and 20 per cent less than the average in the year ending June 30, 1940. Determination of quotas beyond Dec. 31 will be made later.

● RECONSTRUCTION FINANCE CORP. has earmarked $150,000,000 for assisting utilities in financing additional generating units and transmission facilities which the FPC of OPM's power unit may recommend for installation to meet growing defense requirements.

● WEST CANADIAN HYDRO ELECTRIC CORP., which supplies electric light and power to cities and villages in the Okanagan Valley in B. C. is now negotiating for purchase of land bordering Sugar Lake prior to further power development near Vernon, B. C.

IT GUARDS REGARDLESS *of the angle* OF THE WIRE

Get Maximum VISIBILITY

by installing

KEARNEY FULL-VU GUY GUARDS

Install them vertically or obliquely — in any position, Kearney Full-Vu (3½ inch diameter) Guy Guards give maximum visibility from any direction . . . A very important reason why you use guy guards.

They are safe, too, because they have no dangerous edges which might cause costly injury to pedestrians or live stock.

As long as you are buying protection — let a Kearney Representative show you further advantages of obtaining, at reasonable cost, Kearney Full-Vu Guy Guards.

And Another Practical Item

Really, if you aren't now using Kearney Dead End Service Clamps, by all means investigate them . . . Write for information on both these products — Ask a West Coast Kearney Representative. Maydwell & Hartzell, Inc., San Francisco, Los Angeles and Portland.

JAMES R. KEARNEY CORPORATION ST. LOUIS, MO.

The Mark of Quality Products

UTILITY EQUIPMENT

for BETTER Construction

OPM COPPER ESTIMATES; PLANS FOR STEEL OUTPUT

Official OPM estimate for 1942 copper shortage is 770,000 tons, based on assumed unrestricted civilian consumption, plus military requirements. Supply and demand tabulation: Domestic production, 1,100,000 tons; Latin American imports, 500,000 tons; other imports 100,000 tons; secondary copper 100,000—total 1,800,000 tons. Military requirements 1,000,000 tons; essential civilian 400,000 tons; other civilian 1,170,000 — total 2,570,000 tons.

No official definition of "essential civilian" and "other civilian" needs has been made. It is known that copper for utility maintenance and defense expansion is included in the first category, with copper for appliances and non-defense home construction in the second.

West Coast Steel Industry

Nearly one-seventh of the 1,865,000 tons of steel expansion which OPM expects to push on to the West Coast as part of the 10 million-ton expansion program approved by SPAB will be electric furnace operation. Of 243,200 tons of ingot capacity planned from electric furnaces, 151,200 tons is to be located in California, 32,000 tons in Washington and 60,000 tons in Oregon.

Detailed company proposals list 60,000 tons of electric ingot at Los Angeles plant of Bethlehem Steel Co., 7,200 tons at Columbia Steel Co. plant in Pittsburgh, Calif., and 84,000 tons at Niles, Calif., works of Pacific States Steel Co. Northwest Steel Rolling Mills has offered to build an electric furnace in Seattle, Wash., and Oregon Electric Steel Rolling Mills, Inc., the Oregon tonnage.

Montana-Dakota Asks FPC OK on Mountain States Purchase Plan

Montana-Dakota Utilities Co., Minneapolis, has proposed to the FPC that it be authorized to purchase the facilities of the Mountain States Power Co. serving Baker, Plevna and Ismay, Mont. Purchase price would be $95,000 and customers accounts receivable and merchandise held for resale would not be included. The Montana-Dakota company already sells power at wholesale to Mountain States to serve the communities, which are not connected with any other Mountain States properties.

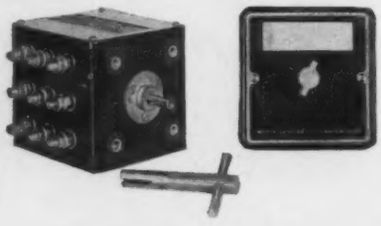
● INCREASE IN PAY is now being requested by the International Brotherhood of Electrical Workers, Local 213, on behalf of members of the association employed in the city electrical department at Vancouver, B. C.

Installed at:

Douglas Aircraft
Boulder Dam
Riverton Project
Bonneville Dam
Imperial Irrigation District
Tennessee Valley Authority

AND NOW

GRAND COULEE



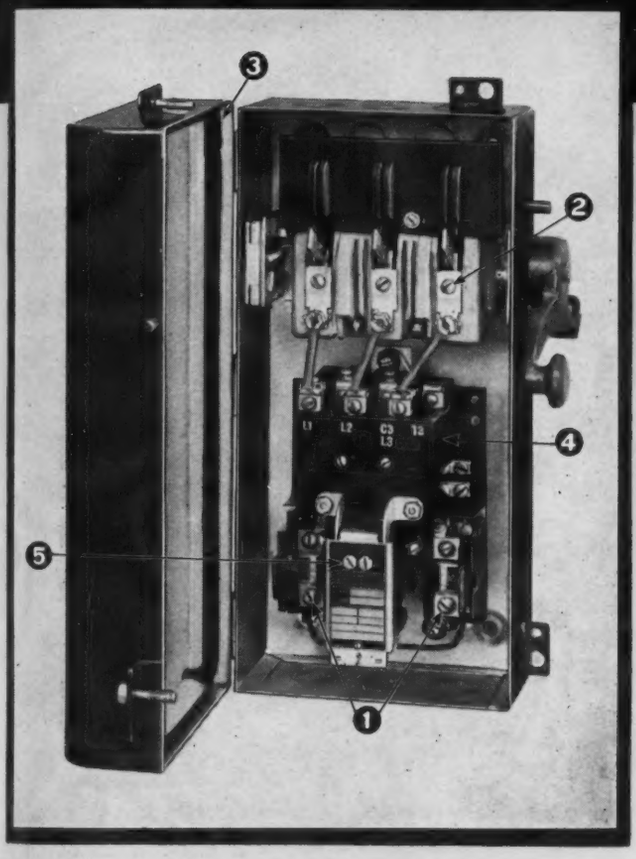
ROTO-TEST SWITCH

FOR RELAY AND METER TESTING OR TRANSFER SWITCH

● You'll find ROTO-TEST Switches on the big jobs everywhere! Their dependability a matter of record—their popularity based on performance. The ROTO-TEST Switch is the result of years of research and experience in the manufacture of testing devices for instruments, relays and meters. It attains a mechanical and electrical perfection never before achieved in a device for this purpose. Safe, efficient—time and space saver. May we tell you more?

METER DEVICES COMPANY - CANTON OHIO

THE OPERATING AND MAINTENANCE ELECTRICIANS VOTED SQUARE D



SQUARE D COMPANY	**98**
COMPANY A	**94**
COMPANY B	**91**
COMPANY C	**91**
COMPANY D	**84**
COMPANY E	**72**
COMPANY F	**71**

● One of the largest automobile plants recently made comparative tests of all makes of magnetic starters. Size 1 combination starters with disconnect switch were used. The tests were made under the supervision of the chief electrician and his assistant. The Starters built by the seven leading manufacturers passed with varying degrees of merit.

The chief electrician, wisely, wanted the independent opinion of the men who actually install, use and repair the electrical equipment. Five of his best men, two from the construction and three from the maintenance department, were asked to examine and rate the seven starters on the basis of (1) overload relays (2) disconnect switch (3) cabinet construction (4) contact mechanism and rupturing capacity and (5) accessibility of parts. The best or equal starter for each feature was scored with 20 points; the others were penalized a relative number of points. The results (as shown in chart above) speak for themselves.

It's the electrician in the factory who knows how control apparatus performs year in and year out. It's his job to inspect it—replace parts when required—above all to avoid costly shut-downs. These plant electricians prefer Square D electrical equipment of all types and kinds.

1 Thermal overload relays of Melting Alloy type. Patented unit construction prevents faulty installation and permits factory test. Units are clearly marked and easily exchanged.

2 Motor circuit switch with quick make and break action, visible blades, line terminal guard and cover safety interlock.

3 Cabinet of heavy gauge sheet steel with felt cover gaskets (NEMA 1A), provisions for padlocking, rounded cover, and baked machine blue enamel finish with aluminum interior.

4 Contact mechanism has straight line, vertical action with double break silver contacts in an enclosed arc chamber to provide high rupturing capacity.

5 Accessibility of parts is accomplished without sacrifice in size. Removal of two screws permits armature assembly and yoke bar to be taken off, exposing all parts for inspection or normal maintenance.

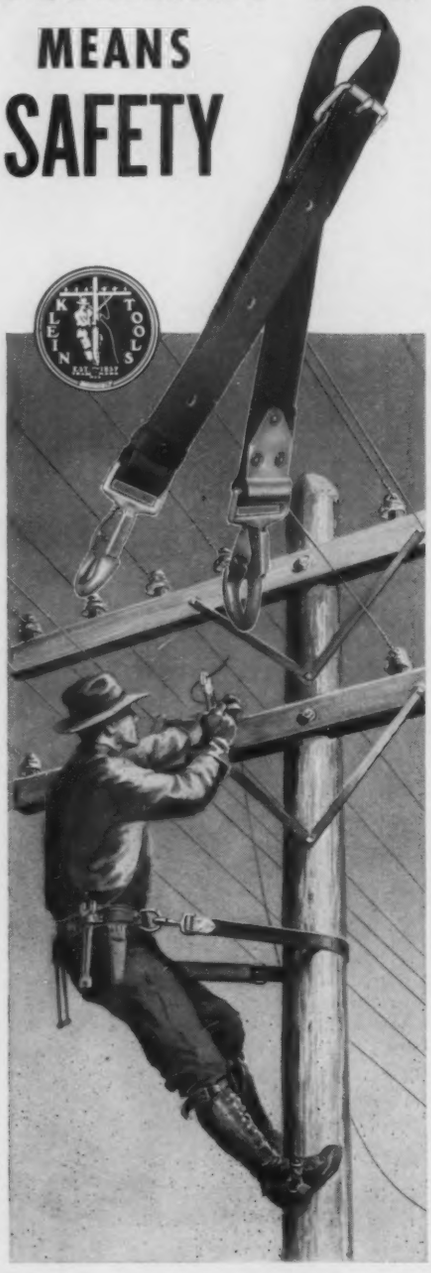
SQUARE D COMPANY

LOS ANGELES - DETROIT - MILWAUKEE

KOLLSMAN INSTRUMENT DIVISION, ELMHURST, NEW YORK

IN CANADA: SQUARE D COMPANY CANADA LIMITED, TORONTO, ONTARIO

EQUIPMENT THAT MEANS SAFETY



WHEN your life depends on a strap no wider than your three fingers, it's important that every inch of it is the finest human skill can make. The painstaking care that enters into the manufacture of Klein-Kord Safety Straps—the rigid inspection that each one is subjected to—is your assurance that when you throw your weight back, your strap will hold you fast.

Your copy of the Klein Pocket Tool Guide will be sent on request.

ASK YOUR SUPPLIER

Foreign Distributor:

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HAWAIIAN ELECTRIC 50TH ANNIVERSARY CELEBRATED

Hawaiian Electric Co., Honolulu, celebrated the fiftieth anniversary of its founding in a variety of ways last month. Noteworthy was a birthday party attended by more than 2,000 employees and their families. Leslie A. Hicks, vice-president and general manager, cut an electrically-lighted birthday cake and awarded service buttons to 137 veteran employees at the party.

The anniversary celebration focused attention upon the tremendous upsurge national defense activities in the Hawaiian Islands has given to the company's operations. Current monthly kilowatt-hour output is running 40% ahead of the same month last year and in one month recently the increase was 54%. Both figures constitute what is believed to be a national record.

To meet defense power demands the company is rushing work on a 35,000-kw. addition to its Alakea steam plant. Boiler equipment will be ready for operation in 1942 and the complete generating unit in early 1943.

Tacoma Council Votes Light Division, Substation Work

The Tacoma municipal electric system has been authorized by the Tacoma City Council to enlarge the Tide Flats substation at a cost of $625,000 by installing additional transformer banks, condensers complete with circuit breakers, switches, steel structures, switchboards and control wiring and extending switchboard and control building.

The light division has also been authorized to purchase cable, network protectors, transformers and miscellaneous equipment required for the installation of an additional feeder in the underground electric distribution system at an estimated cost of $20,000. This work will be carried out by force account.

● BENDIX labor disputes of five weeks' duration has come to an end, according to telegram received at press time from Judson S. Sayre, president, Bendix Home Appliances, Inc., South Bend, Ind. Factory workers resumed regular duties Oct. 23rd after an agreement reached between Bendix Home Appliances and Local No. 9, I.U.U.A. of CIO.

● INLAND EMPIRE Rural Electrification Inc., at Pomeroy, Wash., is planning the construction of 60 miles of rural lines, aside from the 120 miles now under construction. The extension will serve 58 more customers.

The MOST COMPLETE LINE OF Service Connectors

LARGEST VARIETY of types, and a COMPLETE range of sizes. For all kinds of conductors.

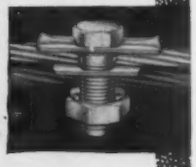
Popular connector at left is carried in stock in ALL sizes, up to 1,000,000 CM. Furnished with or without retainer.

ANY MATERIAL — Hardware Bronze, Silicon Bronze, Aluminum.

MILLIONS IN USE and never one rejection due to performance or workmanship. Can be re-used over and over.

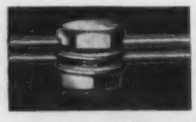
MADE IN OUR OWN PLANT under engineering supervision. Bodies and nuts precision machine-threaded for perfect fit. No sharp edges.

ALUMINUM Connectors machined from hard drawn rod, with forged spacers.



SERVICE POST Connectors for one or more conductors; many types.

SERVICE ENTRANCE Connectors with extruded copper bodies, Everdur screws.



TELEPHONE Service Connectors, brass rod—plain, nickel plated or tinned.

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We think you'll realize that we can't hold back on the Old Gentleman, even though the Detour often takes us away from the places we'd like to go and the people we'd like to see. And we hope you'll welcome us back on Main Street with the same friendly greeting, once the bars to prompt delivery of *all* your electrical needs are down again.

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B.C. POWER CAPACITY IS STUDIED BY POWER CORP.

Need for additional power capacity for British Columbia Electric Railway Co. is being studied according to a recent statement by A. J. Nesbitt, president of the Power Corp. of Canada, top holding company for B. C. Electric.

During the last twelve months customers served increased by 4,137 and kilowatt-hour output reached 50,935,000, Nesbitt asserted. Recent system additions, adequate for the present, include a 7,500-kw. unit in the Brentwood Bay steam plant and a 1,000-kw. unit in the Kamloops steam plant. B. C. Power Corp. has undeveloped power sites representing a potential 803,000 hp. in hydro capacity.

FPC Head Urges Post-War Ban on Utility Monopoly Costs, Prices

That the period folowing the emergency wil bring a grave threat to American institutions unless a way is found to eliminate the social instability which arises from the artificial cost and price barriers resulting from monopoly was the opinion expressed by FPC Chairman Leland Olds before a utility conference called last month by the New Mexico Public Service Commission in Santa Fe.

Monopoly was permitted in the utiilty field, he said, because "people agreed that monopoly was less wasteful." But people failed to recognize, he added, that the establishment of monopoly meant that the incentive to low costs and low prices had been eliminated.

"Utility regulation," Olds said, "was set up to provide a substitute for competition in assuring people the lowest possible rates for the best possible service, but commissions found that they had no cost standards, no yardsticks of rates and costs comparable to those provided automatically by competition. In fact, utility lawyers were able to persuade the courts that the costs of each utility were peculiar to its own conditions and that comparisons between utilities were not valid. This theory, which eliminated even the competitive effort of emulation, did more than anything else to render regulation ineffectual and to open the way to public competition as the only effective alternative."

● POWER from Green Mountain Dam, a unit of the USBR Colorado-Big Thompson project, will be available in 1943 for use in the Rocky Mountain region. Work on the dam is two-thirds completed and the power house is ready

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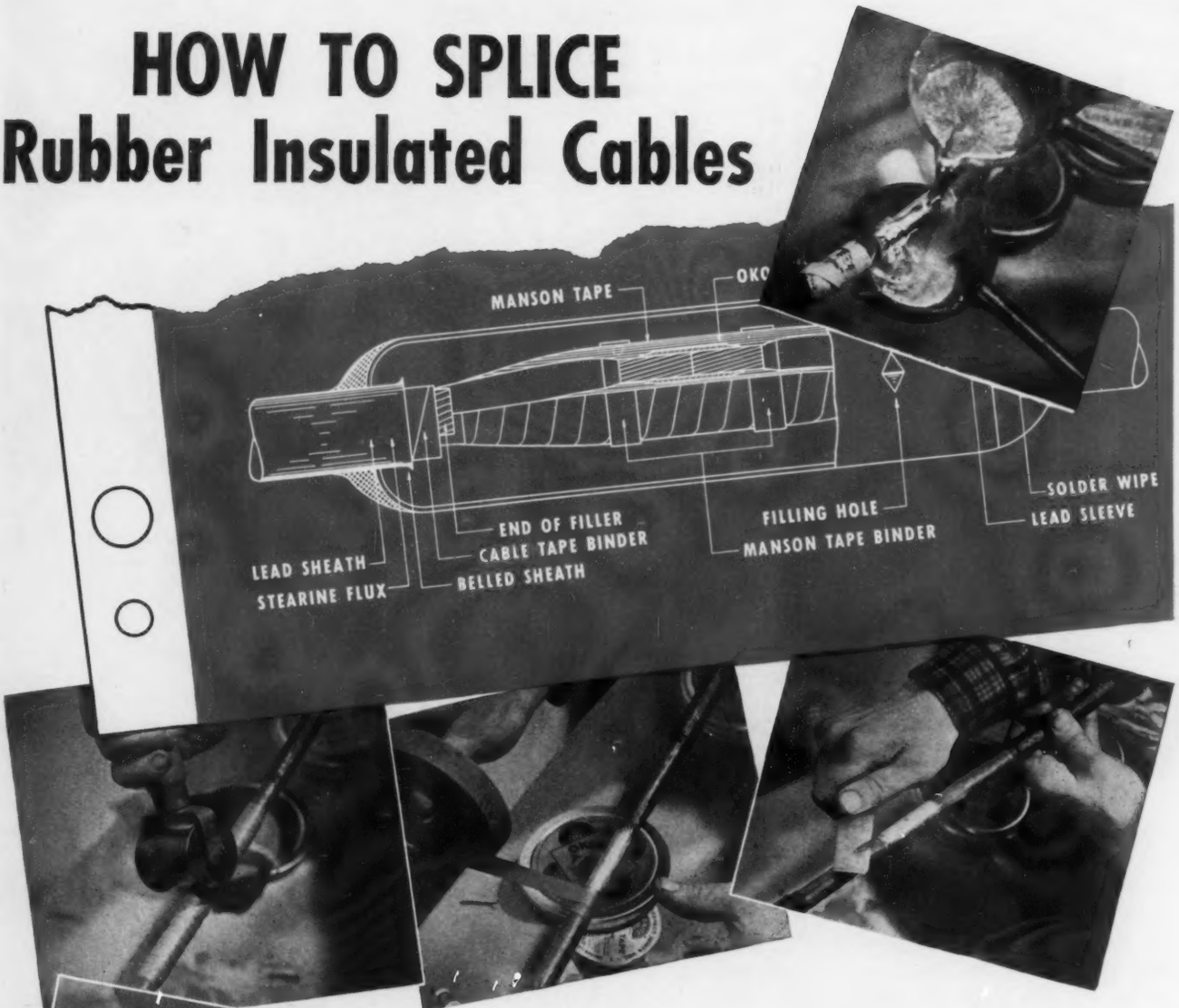

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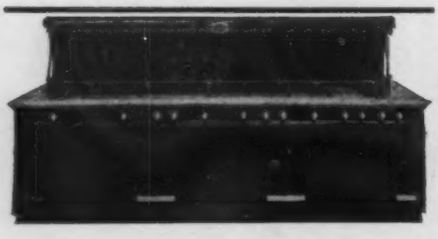

BOULDER DEFICIENCY FUNDS PASSED BY HOUSE

Deficiency appropriations of $6,000,000 for Units 7, 8 and 9 in Grand Coulee power house and of $1,750,000 for an additional 84,000-kw. unit at Boulder Dam have been passed by the House of Representatives. At the same time efforts to re-instate a $3,000,000 appropriation for initial work on three 150-kv. lines from Shasta and Keswick dams to Antioch in California were defeated.

Previously the House appropriations committee had ruled out the transmission line money on the grounds that neither the Shasta nor Keswick plants would be completed until 1943 or later. The funds had been requested by the USBR.

Under schedules presented, the Grand Coulee machines are slated for installation in 1942 and 1943. Whether it will be possible to secure priorities for delivery of equipment for as much generating capacity as this in such a short space of time is not certain. SPAB has ruled that all new construction, whether governmental or private, must be shelved unless it is necessary for defense or for public health and safety.

Four Federal Power Projects Get National Defense Rating

Four additional government power projects have been placed in the national defense category and hence made eligible for priorities in securing materials. They are Parker Dam and Davis (Bullshead) Dam on the Colorado River, Anderson Ranch Dam in Idaho and the Colorado-Big Thompson project in Colorado.

All have been certified by the USBR, which is constructing them, as important defense power producers. Previously assigned to the defense category were Boulder Dam where additional units are being added, the Columbia Basin project in Washington and the Central Valley project in California.

● FEDERAL POWER COMMISSION is combining six annual and 24 monthly reports of various phases of utility operations into a loose-leaf volume "Electric Power Statistics." The FPC binder has tabbed sections to permit cross reference, and data is supplied monthly and annually. Reports covered in the service are energy production, fuel consumption, power requirements and supply, scheduled additions and construction, plant capacity, interstate movements of energy, installed water-power capacity. Another FPC volume "Electric Power Statistics, 1920-1940".

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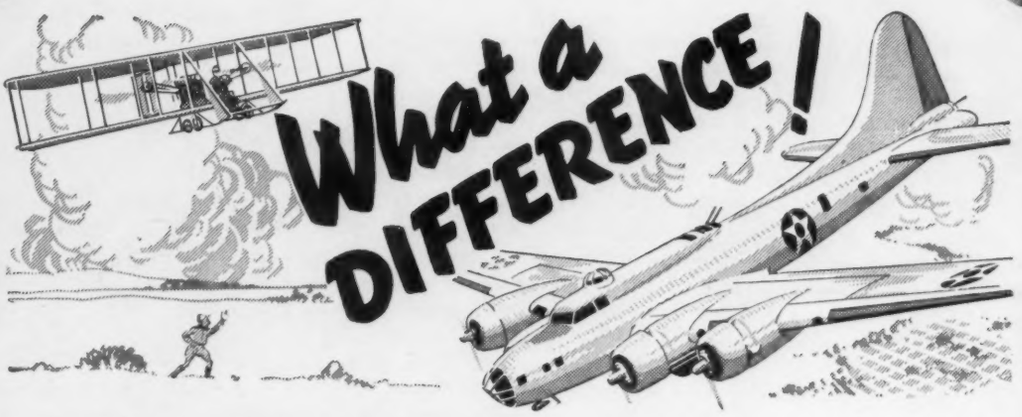

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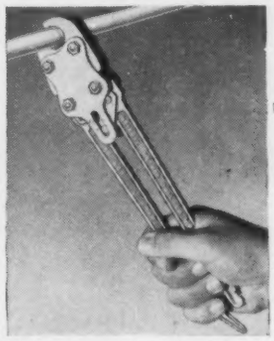

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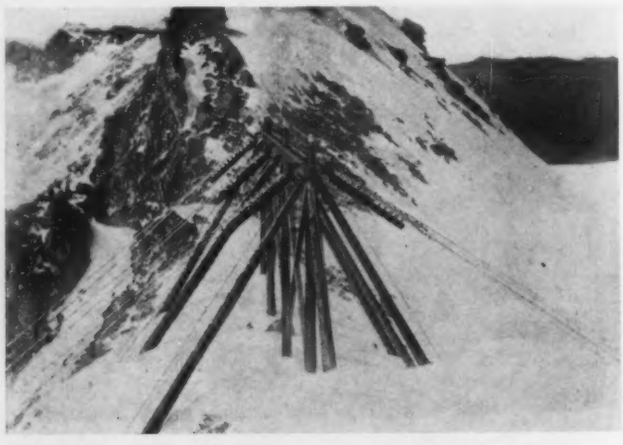
FIFTY YEARS OF SERVICE IS TELLURIDE ACHIEVEMENT

Telluride Power Co., pioneer developer of three-phase, high tension transmission, celebrated the fiftieth anniversary of its founding at Richfield, Utah, recently. Event around which the celebration was built was the initial operation of the Ames Plant near Telluride, Colo., in September, 1891. At that time a 3,000-volt line was built connecting a 100-hp. waterwheel-driven alternator with a 100-hp. synchronous motor at the Gold King mill.

Significant comment on the historical event was that in the Richfield newspaper which said: "As a pioneer in distributing electrical power and light; for its contribution of men capable of giving worthwhile community service; for its contribution to the home payroll and for its tax revenue of around $65,000 annually in this territory, the Telluride Power Company should receive commendation on its golden anniversary. It symbolizes the far-reaching values of initiative fostered by America's system of private enterprise, and serves as a reminder that although there are times when government may serve by supplementing, checking or balancing private industry, government should not supplant worthy, workable, privately owned businesses or industries."

● THE CITY OF BREMERTON has been granted the right to intervene in the Kitsap County Public Utility District's suit to condemn the properties of the Puget Sound Power & Light Co., following a hearing recently in Federal Court in Seattle. The city, through its attorney, will ask that the court not allow the PUD to condemn any property owned by the power company in Bremerton, on the grounds that the city already has an option to purchase such properties.



Telluride Power Co. built the first transmission line over the Rockies. Shown here is the tower on the extremely high summit of Camp Bird Divide.

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47 Ammeters	3 Voltmeters
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330 Bus Supports	74 Cut Outs
161 Current Transformers	5 Power Transformers
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125 Switchboard Fittings	75 Oil Circuit Breakers

425 Other Miscellaneous Items

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DEPT. OF UTILITIES 820 Park St. Alameda, Calif.

Answer to "Who Am I?"
See page 62
J. H. Pengilly

Electriquiz Answers
See quiz on page 64

1. False. In 1932 the Oregon Agricultural Experiment Station used electrically heated "hovers" to provide a safe, warm place for pigs less than two weeks old to "park" between meals. Now pig brooders are in general use.

2. False. Ohio has 150,738 electrified farms, while California is second with 125,738.

3. True. Agricultural sales of electricity in California in 1940 totalled 1,100,218,000 kw.-hrs. Wisconsin was second with 84,450,000 kw.-hrs.

4. False. The use of artificial light prolongs the day in winter so that the proportion of winter eggs is increased when prices are highest.

5. True. With high relative humidity, as may prevail in coastal sections, evaporation is reduced.

6. True. Field applications have not proven satisfactory because of high heat loss.

7. False. A sterilizer is a box or cabinet into which bottles, cans or other milking utensils are placed after washing.

8. True. Figures throughout California are: Sacramento Valley, 30 to 36 in., San Joaquin Valley, 36 to 42 in., Southern California coastal areas, 30 in.; Imperial Valley, 36 to 48 in., Antelope Valley, as high as 72 in.

9. False. They do not occur in the visible spectrum. Colored glass filters out undesired colors.

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SAVAGE "LEND-LEASED" TO BRITIAN AS CONSULTANT

The "lease-lend" program has reached out to embrace John L. Savage of Denver, chief designing engineer for the U. S. Bureau of Reclamation, who has been "borrowed" by the British government to act in a consulting capacity on several huge hydroelectric projects in Australia and India.

Savage, with nearly 30 years' experience designing federal dams and power plants, was loaned to aid Great Britain's war program to speed present war materials production and prepare for postwar industrial and agricultural renaissance.

Projects in which Savage will participate abroad include a hydroelectric development near Melbourne, Australia, another at Sidney, Australia, and a third located close to Punjab, India. Dams and power plants at these points are planned to relieve already-overtaxed industrial centers now, and be in readiness for peace time service when hostilities cease.

Date of departure for Savage was fixed at Oct. 26 when he was to fly by clipper from San Francisco to Australia. He expects to be gone about six months.

WISTING TO AID AIRCRAFT INDUSTRY ON N. W. LEAVE

George H. Wisting, assistant general manager of Northwestern Electric Co., Portland, in charge of new business, has been granted a leave of absence by the company to accept a position as vice-president and director of the Columbia Aircraft Industries, Inc., a local concern organized to make airplane parts. L. T. Merwin, president of the Northwestern company, in announcing the move, stated that the aircraft company had a number of important contracts with large plane manufacturers of vital importance to the defense program. "Northwestern Electric is glad to cooperate in this effort by temporarily releasing Wisting to assist Columbia Aircraft in its program," said Merwin.

Wisting stated Columbia Aircraft has a $3,000,000 back-log of orders, is now working over 600 men and expects to expand in the near future.

John C. Plankinton, formerly manager of commercial and industrial sales for the Northwestern Electric Co., will assume Wisting's duties as head of the new business department.

● STANLEY W. SCARFE has been appointed assistant manager of the Central Station Dept. for General Electric Co. in Los Angeles. The appointment was made by S. E. Gates, General Electric Co. Los Angeles manager. Scarfe has been active in electrical circles in the West since 1926; he was G-E resident agent in Fresno from 1926 to 1932 and in the same position at Sacramento until 1937, when he went to San Francisco as assistant to the manager. He was called to southern California in 1939 to work in the central station department. Scarfe has been active in the PCEA as chairman of the Industry Information Committee and chairman of the Administrative Service Section of the Guidance Committee. He is a member of AIEE and the Los Angeles Electric Club.

● WALTER T. BIVINS is now superintendent of the motive power and overhead lines department of the Market Street Railway Co., San Francisco. This new responsibility results from the combining of the motive power and overhead lines departments following the retirement of S. L. Foster, who headed the latter department for many years.

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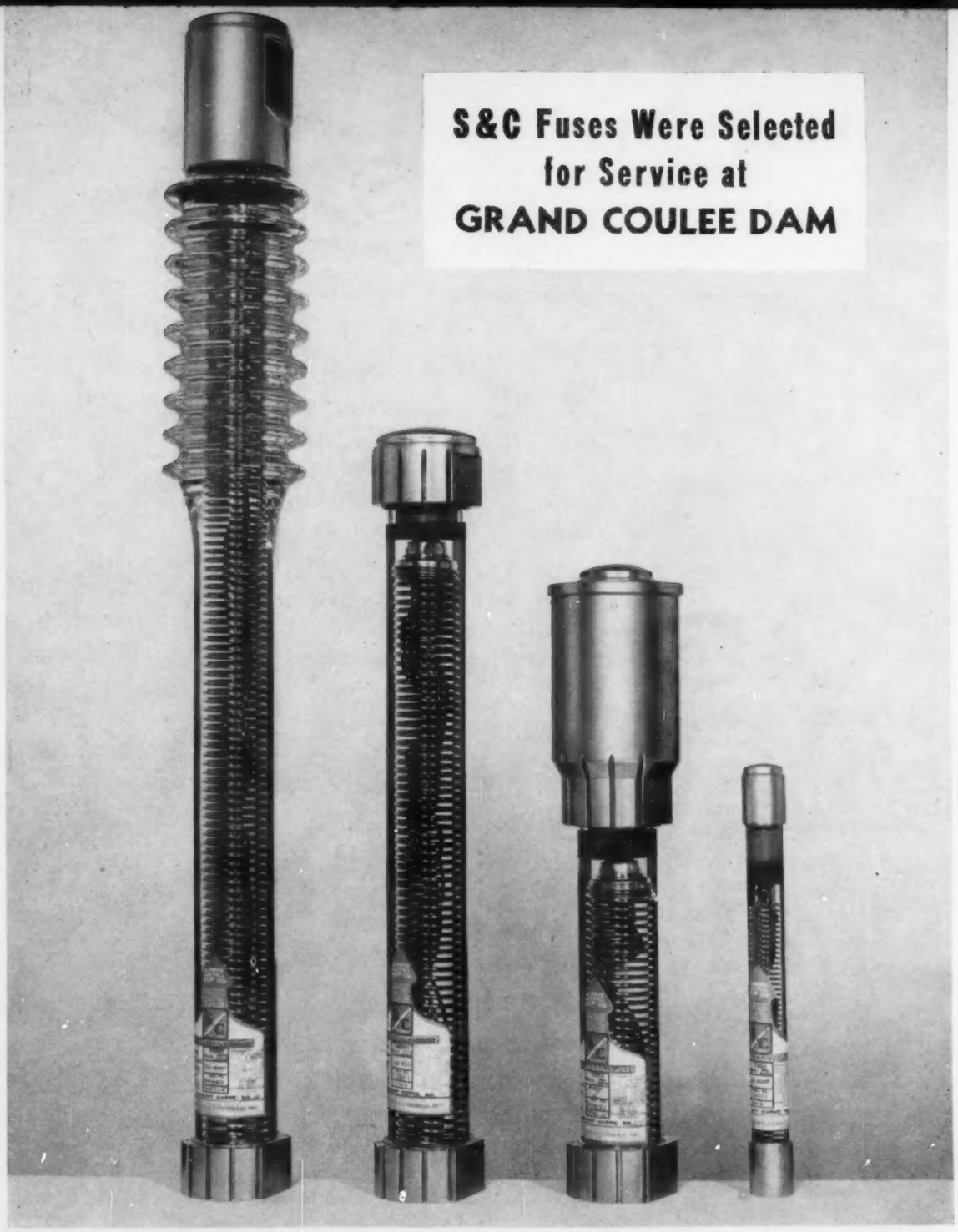

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Every S & C Liquid Fuse is precision-made—accurate, uniform, and sure to perform the duty for which it is designed. And whether you buy them in small or large lots, all of any type or size are exactly alike. The constant increase in use of S & C Liquid Fuses year-in and year-out is good evidence of their recognized dependability. They are made in ratings from 7500 to 138,000 volts, and ½ to 400 amperes.

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2 East End Ave. New York

● GEORGE M. GADSBY, president and general manager of the Utah Power & Light Co., has been appointed district coordinator of the office of production management. A district OPM office has been opened in Salt Lake City to serve Utah, southern Idaho, eastern and southern Nevada. Ralph E. Bristol is the district field manager.

● WILLIAM S. HILL, general superintendent of the Grays Harbor PUD at Aberdeen, Wash., has been named acting manager succeeding Robert W. Beck. H. E. Bailey, PUD commissioner, announcing the appointment, stated that Hill will serve until someone is selected as manager on a permanent basis.

Harry Carroll, PG and E Sales Executive Passes Suddenly

Harry N. Carroll, manager of Commercial and industrial electric sales for Pacific Gas and Electric Co., died suddenly in San Francisco Oct. 23 from a heart attack. Born in Carthage, Mo., in 1886, Carroll was a graduate of the Missouri School of Mines. Following several years of general mining experience in the Middle West, he went to South America in 1919 for the International Petroleum Co. as an engineer on pipeline construction work in Columbia.

Carroll joined San Joaquin Light & Power Corp. in Fresno in June, 1923, as an industrial power salesman. In March, 1927, he became sales manager of Great Western Power Co. and a short time later division manager for the company in San Francisco, a position he occupied when the Great Western was merged with PG and E. Since that time he has held various executive positions in the PG and E sales department.

He was a past president of the San Francisco Electric Club and was a former chairman of the business development section of the Pacific Coast Electrical Association. At the time of his death he was chairman of the PCEA Industry Information Committee.

● ELMER F. ANDERSON, electrical engineer with Portland General Electric Co., died Oct. 4, 1941, following a brief illness. He was born in Portland in 1896 and educated there and in Oregon State College in electrical engineering, a profession he followed all his life. He spent two years, following graduating, in advanced engineering training with the General Electric Co., in Schenectady. He then joined the engineering department of Portland General Electric Co., with which he has been associated ever since.

● EARL E. WHITEHORNE, vigorous editor of *Electrical Contracting*, though confined to his bed for more than a year, died Oct. 23, at his Caldwell, N. J. home. Last time he was West was at the NECA convention, Los Angeles, in 1938, at which he spoke as well as in San Francisco and Salt Lake City. He had been editor of *Electrical Merchandising*, contributing editor on *Electrical World* and was made editor of *Electrical Contracting* in 1936. He was secretary of the James H. McGraw Awards committee, director of public relations for McGraw-Hill Publishing Co., member of many industry committees, such as the "Industry Conference on Wiring" in 1926.

● M. EARL KIPP, proprietor of Aptos Electric Construction Co., San Francisco, died Sept. 27 after some months of ill health.

● HARRY GARBUTT, known in distribution circles of San Francisco since early days, died Oct. 20 of heart ailment. He was manufacturers' representative for Spang-Chalfant, Inc. and other lines and for many years had been with Westinghouse Electric Mfg. Co.

● WILLIAM F. NEIMAN, research engineer of the public relations and sales department, Pacific Gas and Electric Co., died suddenly Oct. 8 while attending a building officials conference at Santa Barbara. He began with PG and E in 1903 and at one time held the position of general sales manager of Great Western Power Co. He was active in Code and ordinance affairs and a member of the International Assn. of Electrical Inspectors.

● THORNTON WOODROW HAWLEY, chief clerk, department of public relations and sales, Pacific Gas and Electric Co., died Sept. 12 after 37 years of service with the company. He served as secretary of the division managers' meetings and of the Central Safety Council. He joined the Oakland Gas & Light Co. as clerk in 1904.

● RODNEY F. KENYON, former electric contractor and of late years an engineering estimator for T. L. Rosenberg Co. and with Pacific Electric Motor Co., Oakland, Calif., died Oct. 11 in Oakland.

● ERNEST ROGERS, 68, assistant to the president, B. C. Electric Railway Co., died in Vancouver recently. Born in Scotland, he came to Canada in 1891, joined the B. C. Electric in 1903 as a clerk in the accounting department.

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PROFILES *of the month*

Frank Carroll (left above) Santa Cruz electrical contractor, presided at Watsonville PCEA regional conference; recently reestablished his original firm, Frank Carroll Electric Co. in Santa Cruz. William H. Sullivan (right above) has been named steam engineer for Westinghouse's Pacific Coast district. He will be active in negotiations involving steam turbines, for land and marine uses. Hotpoint "Champ" B. R. Lind, Graybar Electric Co., Seattle, is shown with J. C. Platt, Hotpoint Seattle district sales mgr., (right center). Lind won Hotpoint wholesale distributor representative contest over field of 300, awarded a trip to Mackinac Island camp. This picture on boat shows Lind at left. C. E. Weitz, G-E lighting expert (left below), recently toured PCEA district meetings, addressed G-E "All-Out" lighting sessions throughout the West. W. L. Gaffney (right) recently elected president of N.W. Section, IAEI, is chief electrical inspector of Tacoma.

Preview of coming campaigns by

P·G·and E·

COMMANDS MORE SERVANTS THAN ALADDIN'S LAMP

ELECTRIC APPLIANCE SOCIETY OF NORTHERN CALIFORNIA

NOVEMBER

Electric Cooking — Lighting — Heating

ELECTRIC RANGES will be featured in a big, attention-getting advertisement during the second week in November—in all our electric territory except San Francisco.

BETTER-SIGHT LAMPS and LIGHTING FIXTURES will be the subject of our ad scheduled for the third week in November. This ad will run throughout our electric territory.

ELECTRIC PORTABLE HEATERS — increasingly popular Christmas gift suggestion—will be the headlined item in our final November advertising, which is also scheduled for our entire electric territory.

All ads will be strictly promotional and will say nothing to detract from dealer copy. They will, in fact, conclude with the invitation to "SEE YOUR DEALER".

NOV. 1-30

EW 111-1141

DEALERS: By watching this page from month to month you can keep informed of sales promotional campaigns to be sponsored by the Pacific Gas and Electric Company and the Electric Appliance Society. Detailed information will be supplied, as usual, through the mail. If such information is not received, call our local office or write Electric Appliance Society, 1355 Market St., San Francisco, Calif.

LIKE A PUMP WITHOUT A HANDLE

To the electrical industry a home without adequate wiring is in the same class with a pump without a handle. Something essential is missing.

In a home with plenty of outlets the tenants are enabled to take advantage of all the conveniences the use of electricity provides. They can use all the toasters, washers and irons you can sell them.

Continue to promote adequate wiring in all the new houses that are going up in your community. Talk to builders and contractors and home owners and architects about it. Put something about it in your advertisements. Help make people in your community conscious of the advantages of adequate wiring. You'll be building for your future profit in appliance sales.

For more information, help and material on adeqate wiring write to

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